DESIGN DEVELOPMENT | JINGYING ZHENG | SUMMER 2025 FINAL

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SITE ANALYSIS

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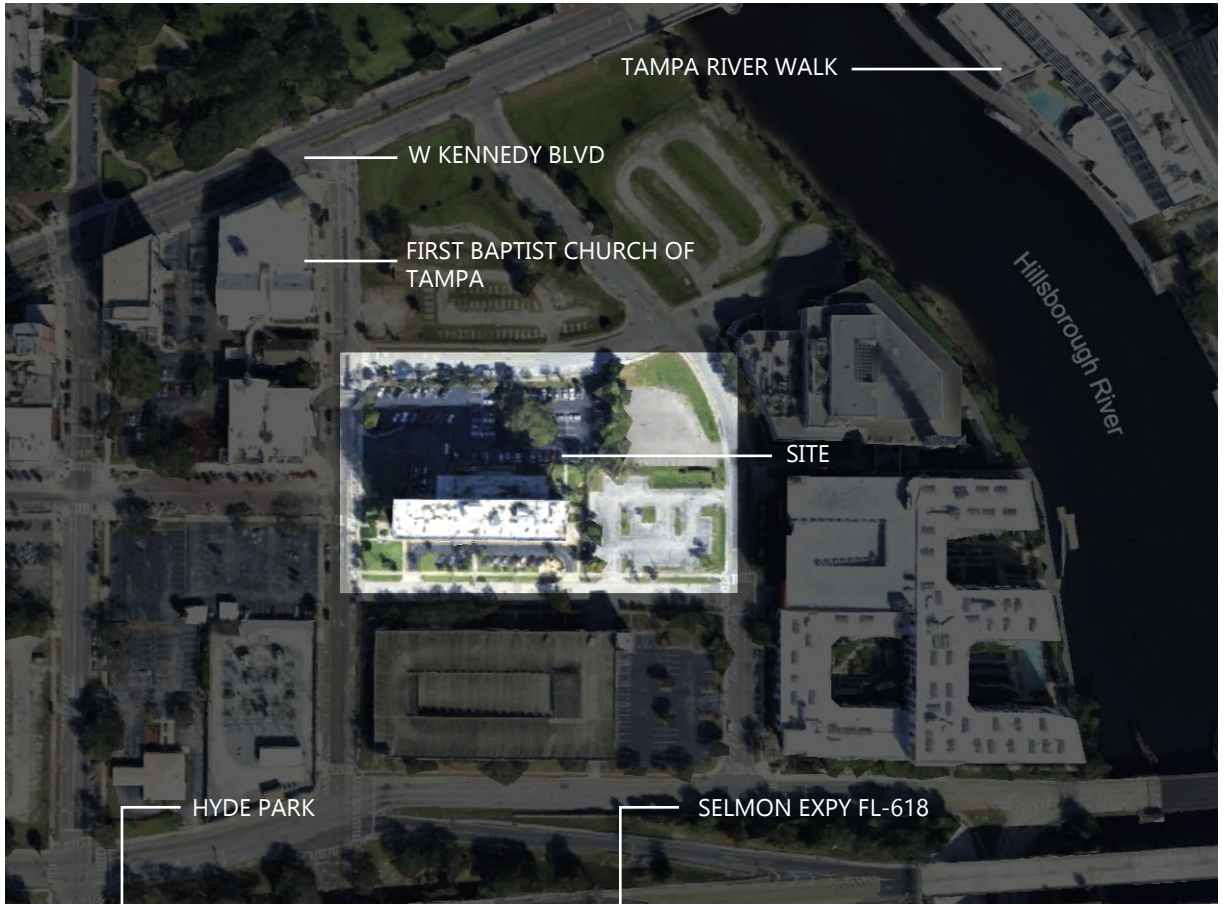

WEST TAMPA, FLORIDA

ADDRESS: 215 W Grand Central Ave, Tampa, Fl, 33606

OCCUPANCY: Residential Group R-2

ZONING: RM 75 (Residential Multi-family)

SITE AREA: 62,500 SQ/FT (1.43 Acres)

LATITUDE: 27.9444° N

LONGITUDE: 82.4620° W

This project is a development design proposal for a 20-story residential tower in the West Tampa neighborhood of Tampa, Florida. West Tampa is a historic district celebrated for its rich cultural heritage and strategic proximity to downtown. As the area continues to undergo revitalization, it has become an increasingly attractive location for new residential development.

The site offers convenient access to downtown Tampa's business hubs, entertainment venues, and scenic waterfront areas. It is well-connected by major roadways and public transportation, making daily commutes efficient and accessible. Additionally, West Tampa features a vibrant mix of local shops, restaurants, and public parks, all of which contribute to a high quality of life.

Given these advantages, this location is ideal for a high-density residential tower. It meets the rising demand for urban living while blending modern amenities with the distinctive character of a historic neighborhood.

SITE PLAN

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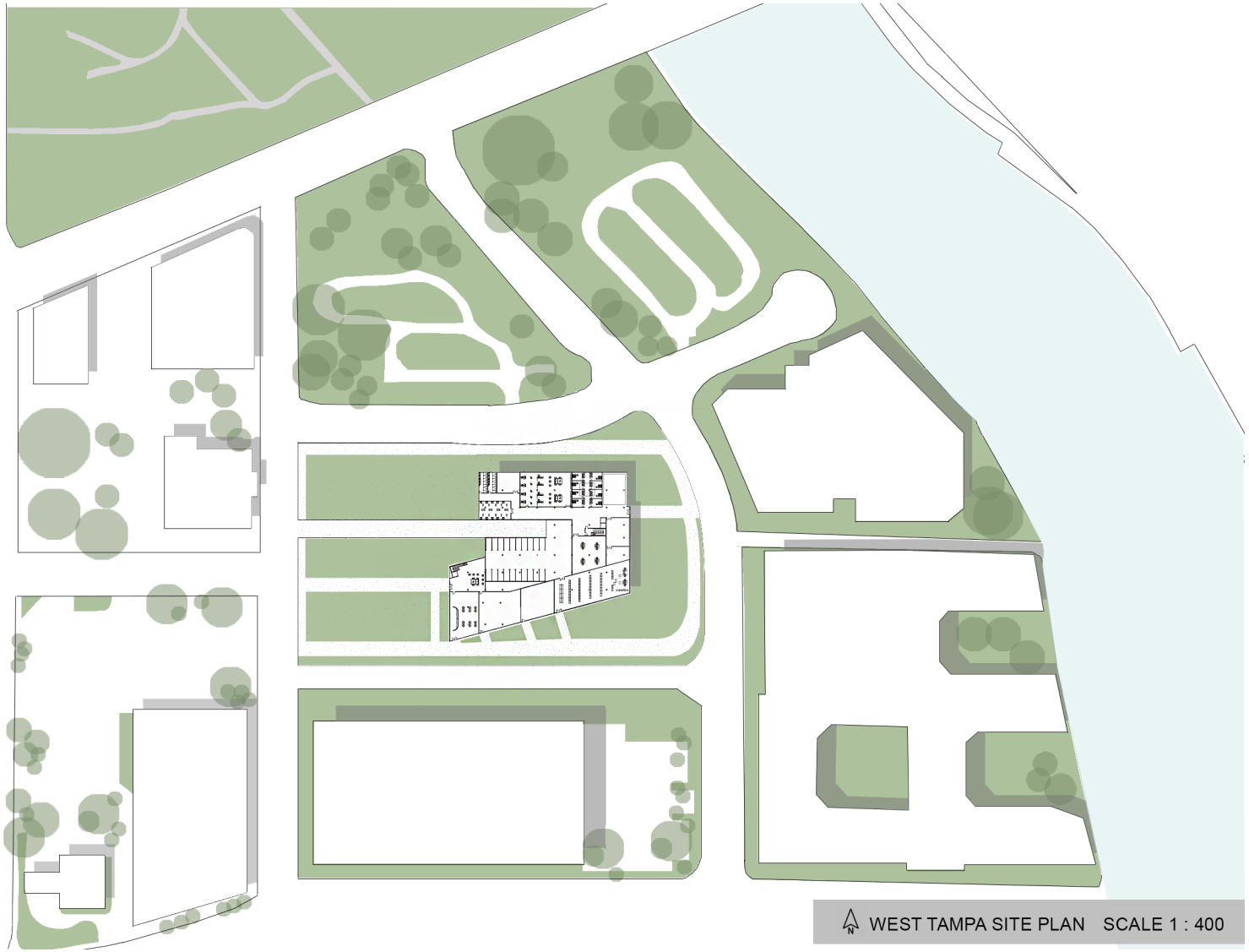
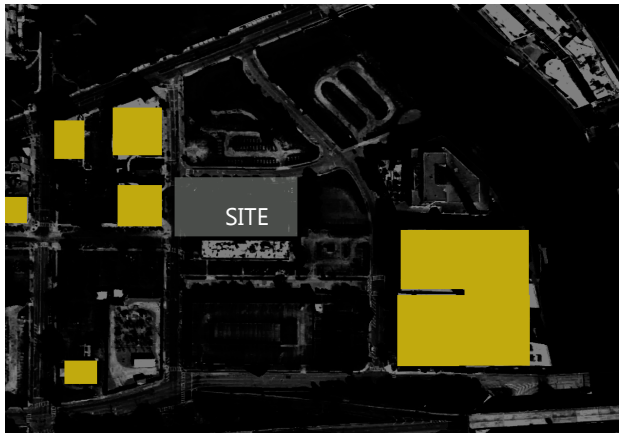


WEST TAMPA SITE PLAN SCALE 1 : 400

NEARBY HIGHWAY & ROADS SYSTEM



NEARBY RESIDENCE/NEIGHBORHOOD

NEARBY RECREATION & SERVICE

SITE PLAN | SERVICE

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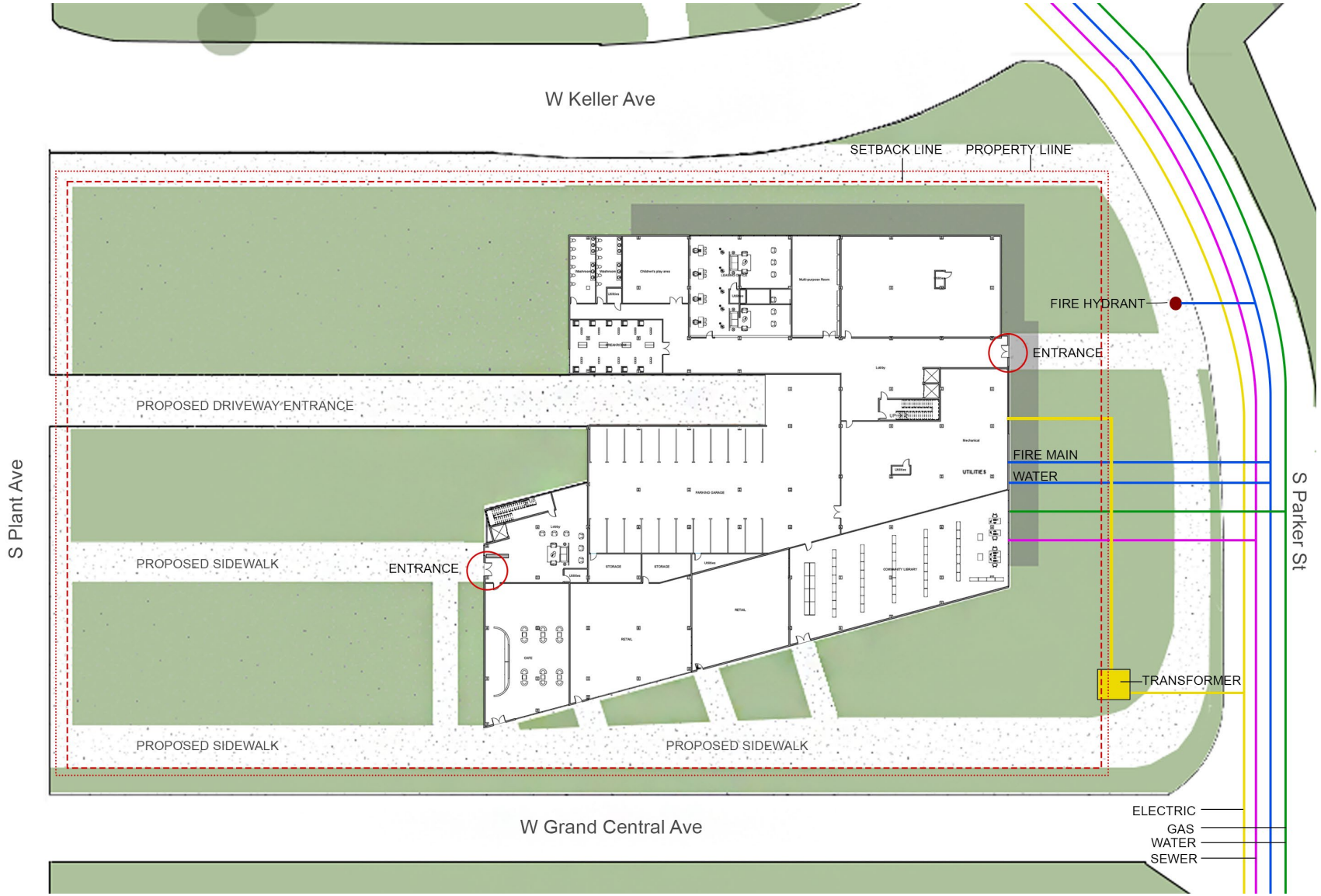

SITE PLAN KEY

- ELECTRIC
- GAS
- WATER
- SEWER
- SETBACK LINE
- PROPERTY LINE

DETAILED SITE PLAN SCALE 1″ = 100′ – 0″

ENVIRONMENT ANALYSIS

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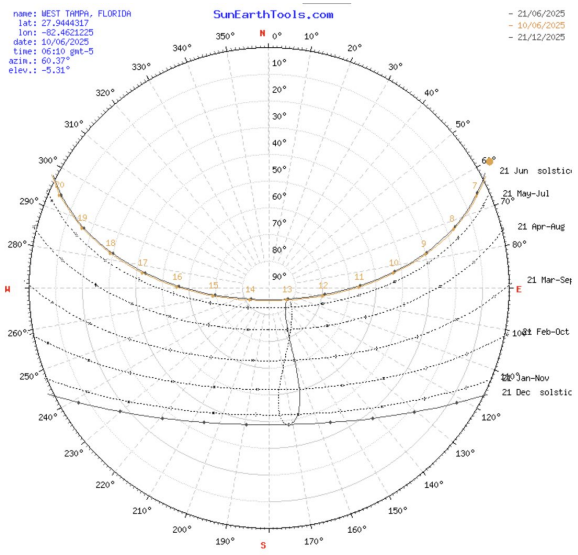
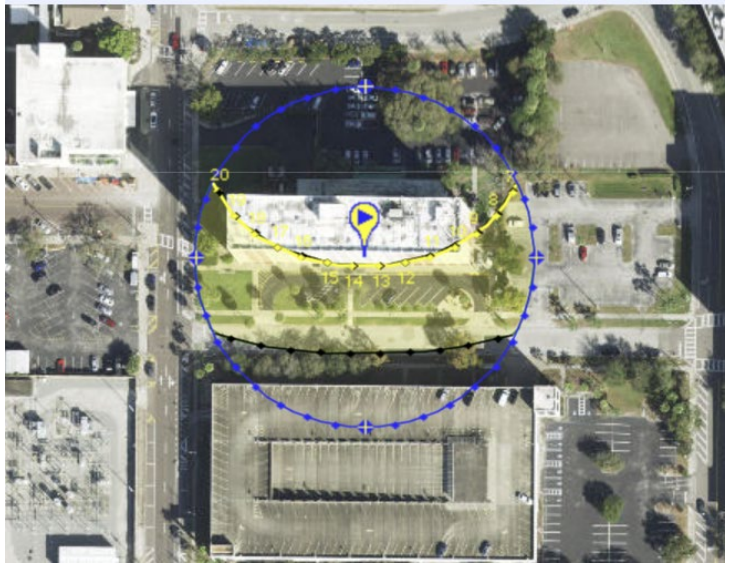
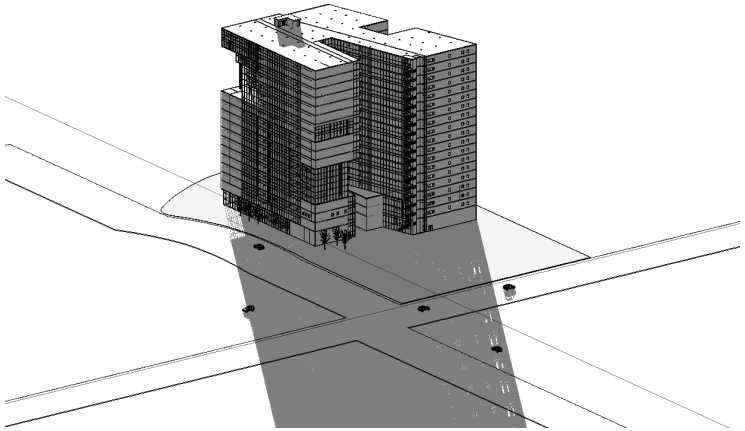
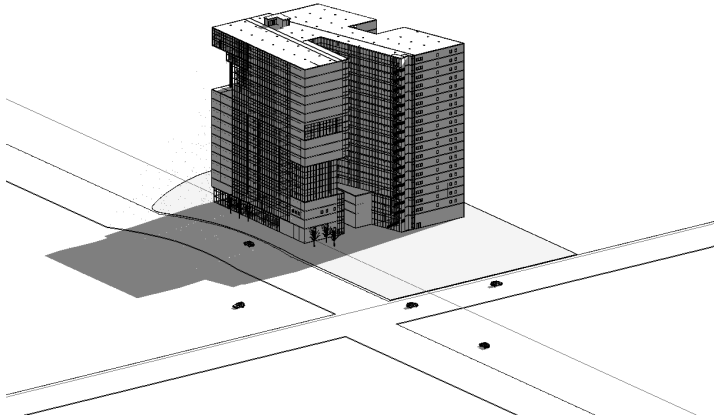
The site at **West Tampa** is shaped by several key environmental elements that influence its architectural potential. Located in a humid subtropical climate zone, the site experiences hot summers, mild winters, and high humidity levels, which support strategies such as natural ventilation, deep overhangs, and high-performance glazing to manage solar gain. The sun path runs high in the southern sky, allowing optimal orientation for daylighting and potential solar energy collection on the tower's roof or south-facing facades. Additionally, its proximity to the **Hillsborough River and Tampa Bay** enhances prevailing breezes from the west and southwest, offering natural cooling opportunities. The residential tower integrates **balconies, rooftop gardens, and open-air community spaces**, which not only encourage **social interaction** but also support **cross-ventilation and passive cooling**, creating a healthier and more environmentally responsive living environment.



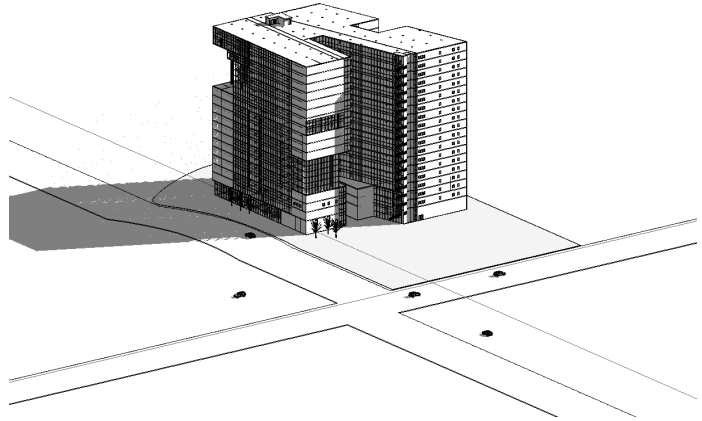




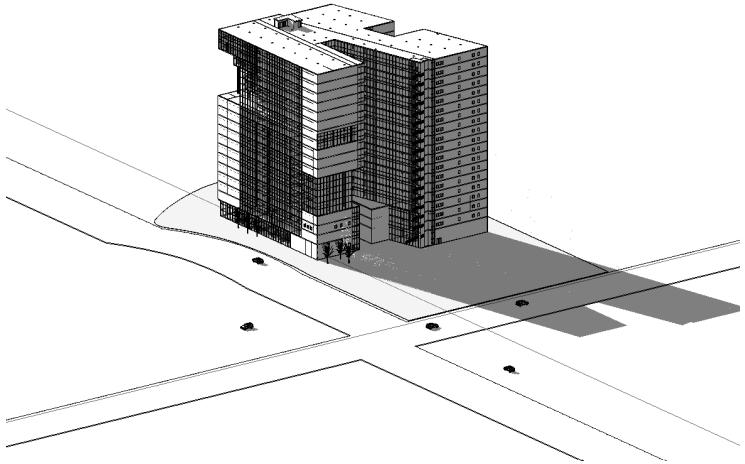
WINTER SOLSTICE 8AM



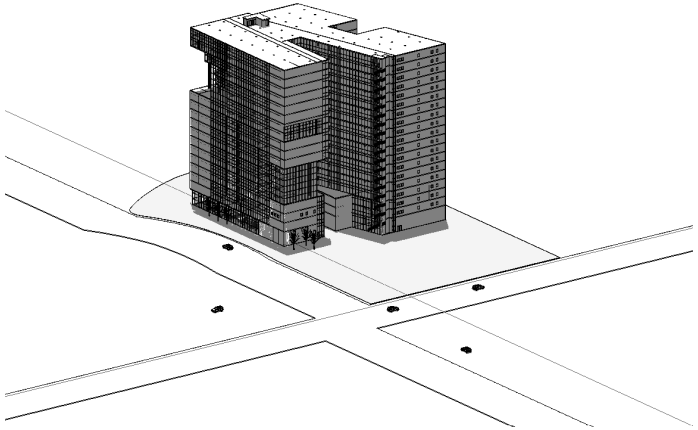
WINTER SOLSTICE 12PM



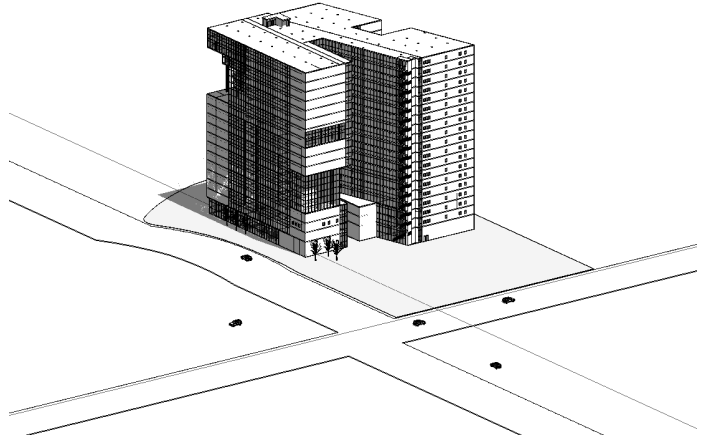
WINTER SOLSTICE 2PM



SUMMER SOLSTICE 8AM



SUMMER SOLSTICE 12PM



SUMMER SOLSTICE 2PM

BUILDING CODE

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PROPOSED PLOT AREA: 250' × 250' = 62,500 sq ft

TOTAL BUILDING AREA: 62,500 × 20 = 1,250,000 sq f

NUMBER OF STORIES: 20

OCCUPANT LOAD:

RESIDENTIIAL (R2) - 200 gross sq ft/ occupant

BUSINESS (B) - 150 gross sq ft/ occupant

MERCANTILE (M) RETAIL - 60 gross sq ft/ occupant

TYPE	PROPOSED AREA	OCCUPANT LOAD FACTOR (TABLE 1004.5)	OCCUPANT LOAD	CODE REFERENCE
RESIDENTIAL (R-2)	62,500 × 17 = 1,062,500 sq ft	200 gross sq ft / occupant	1,062,500 ÷ 200 = 5,313 occupants	Table 1004.5, Chapter 3 Section 310.4 (R-2)
Business (B)	62,500 × 2 = 125,000 sq ft	150 gross sq ft / occupant	125,000 ÷ 150 = 833 occupants	Table 1004.5, Chapter 3 Section 304 (B Occupancy)
Retail / Lobby (M)	62,500 × 2 = 125,000 sq ft	60 gross sq ft / occupant	125,000 ÷ 60 = 2,083 occupants	Table 1004.5, Chapter 3 Section 309 (M Occupancy)
Parking Garage	4,788 × 4 = 19,152 sq ft	(R3)1.5 spaces/unit		Chapter 11 ADA

GENERAL

CODE ITEM	CODE REFERENCE	SPECIFICATION
Occupancy Classification	Chapter 3, 302.1	Group R-2 (multi-family residential)
Construction Classification	Chapter 6, Table 601 , Section 602	Type I-A or I-B (required for high-rise construction)
Height Allowed	City of Tampa Code 27-156 (RM-75)	No maximum height in RM-75 (limited by FAA/Fire Code)
Stories Allowed	Chapter 4, Section 403 Chapter 5, Section 504.3	Unlimited
Area Allowed	Chapter 5, Table 506.	Unlimited (Type I-A, Group R-2)

FIRE PROTECTION

CONSTRUCTION ELEMENT	MATERIAL USED	FIRE-RESISTANCE RATING REQUIRED	CODE REFERENCE
Structural Frame	Steel column encased with concrete	3 hours	Chapter 6, Table 601 (Type I-A)
Bearing Walls – Interior	Reinforced concrete	3 hours	Chapter 6, Table 601
Bearing Walls – Exterior	Reinforced concrete	3 hours	Chapter 6, Table 601, Section 602
Non-Bearing Exterior Walls	Aluminum curtain wall system with glass	3 hours	Chapter 6, Table 602, Section 603
Non-Bearing Interior Walls	Drywall/gypsum over metal framing	1 hour (minimum)	Chapter 7, Section 708
Floor Construction	Reinforced concrete slab on steel beam structure	2 hours	Chapter 6, Table 601
Roof Construction	Concrete deck	1.5 hours	Chapter 6, Table 601
Shaft Enclosures (elevators, stairs)	Concrete	2 hours	Chapter 7, Section 713
Fire Separations (unit-to-unit)	Drywall or concrete wall	1 hour	Chapter 4, Section 420.2 Chapter 7, Section 708
Sprinkler System	NFPA 13 required	Full coverage required for high-rise R-2 occupancy	Chapter 9, Section 903.2.11

DEVELOPMENT / SYSTEMS

CODE ITEM	CODE REFERENCE	SPECIFICATION
Sprinkler System	IBC Chapter 9 Section 903 / NFPA 13	Full coverage wet-pipe system
Standpipe	IBC Chapter 9 Section 905 / NFPA 14	Class I system in stairwells
Fire Alarm / Notification	IBC Chapter 9 Section 907 / NFPA 72	System with smoke detectors, pull stations, AV devices compliant
Plumbing Fixture Counts	IBC Table 403	Residential: 1 WC/1 lav per unit
Elevator Requirement	IBC Chapter 30 Section 3002	1 per 50 units min. → 2+ required
Structural System	IBC Chapter 16 Section 1604	Steel-concrete composite structure with reinforce concrete shear walls
Foundation System	IBC Chapter 18 Section 1810	Reinforce concrete deep piles (30“ diameter) – well-suited to Tampa’s soil and flood conditions
HVAC Requirements	ASHRAE 90.1, IBC Chapter 12 Section1202	Lennox AHUs + Trane Agility magnetic bearing chiller (R-513A); high energy performance
Energy Code	IECC 2021 / FBC Energy	Compliant based on equipment specs and glazing descriptions (Low-E, insulated walls)
Curtain Wall Specs	ASTM E330, AAMA, Chapter 14 Section 1406	Kawneer 1600 with SSG, seismic, hurricane-rated – suitable for coastal FL
Plumbing Pipe Sizes	IPC 2021 / Florida Plumbing Code	Stack: 3" vent, 4" FW riser, 3" soil stack, 1.5"–1" branch lines – compliant
Chiller & Cooling Towers	ASHRAE 90.1 / Manufacturer Specs	Trane Agility Magnetic Chiller (175–500 tons) + EVAPCO LPT towers – efficient and compact
Lighting & Electrical	NEC 2023 / ASHRAE 90.1	80 panels (4 per floor), 3 transformers, 2,500A generator, high efficiency fixtures
Roof Drainage	IPC 1106 / IBC Chapter 15 Section 1503.4	Roof drains & overflow drains noted – ensure redundancy for code compliance

PARTI | BASIC MASSING

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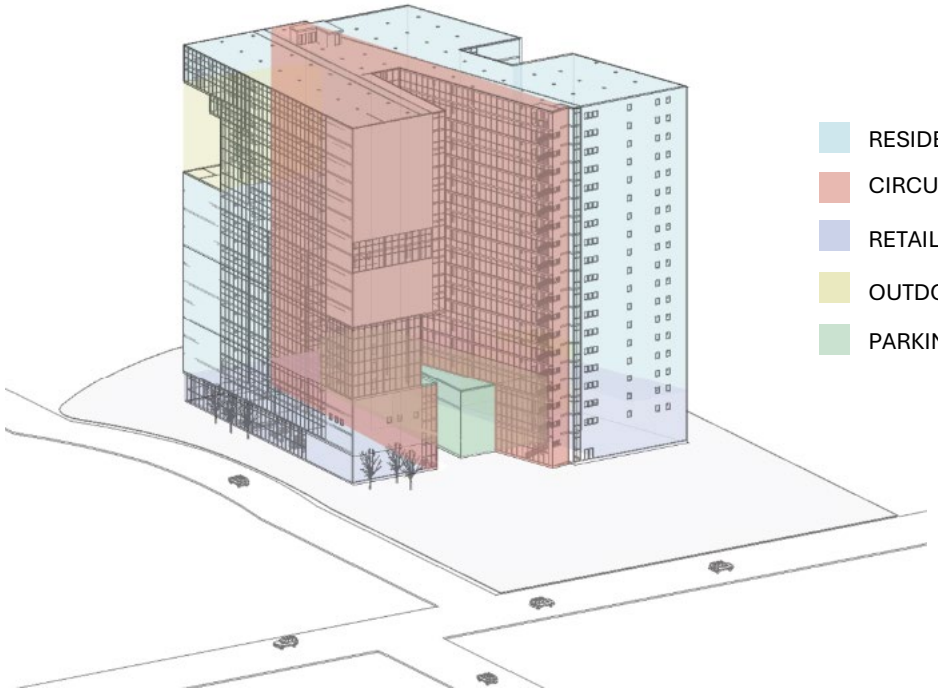


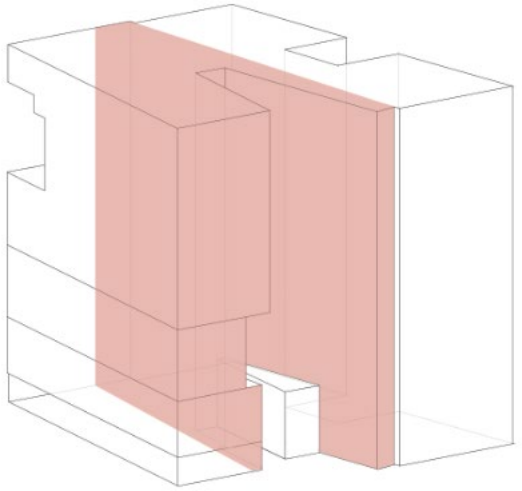
RESIDENTIAL UNIT (R-2)

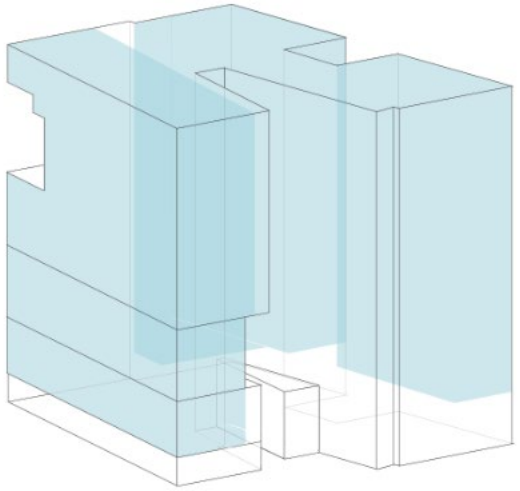
CIRCULATION

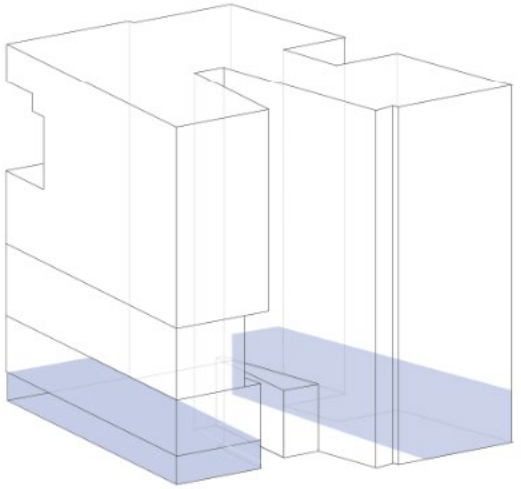
RETAIL/LOBBY/BUSINESS (M & B)

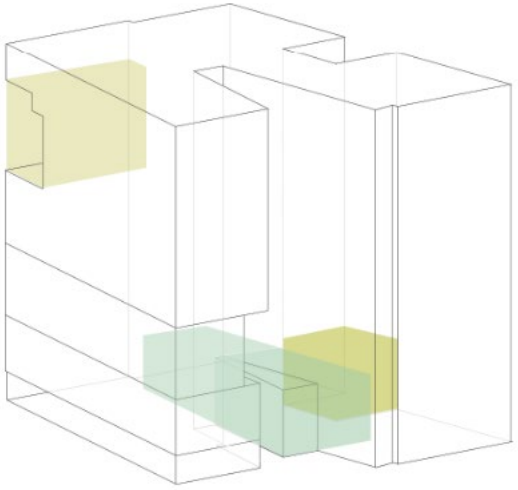
OUTDOOR/ROOFTOP GARDEN

PARKING GARAGE









This 20-story mixed-use residential tower is organized as a vertical community, combining living, leisure, and public functions. The ground floor features a double-height space with a café, restaurant, retail, community library, study area, children's zone, leasing office, and clubhouse/break room, creating an active and inviting public interface.
Above, a four-story parking garage provides resident and visitor access while separating public zones from private living spaces. The upper 17 stories house four residential units per floor, with units designed for optimal light, views, and ventilation. Two outdoor garden terraces, placed at different heights, offer communal green space and passive cooling.

CIRCULATION | ENTRANCE

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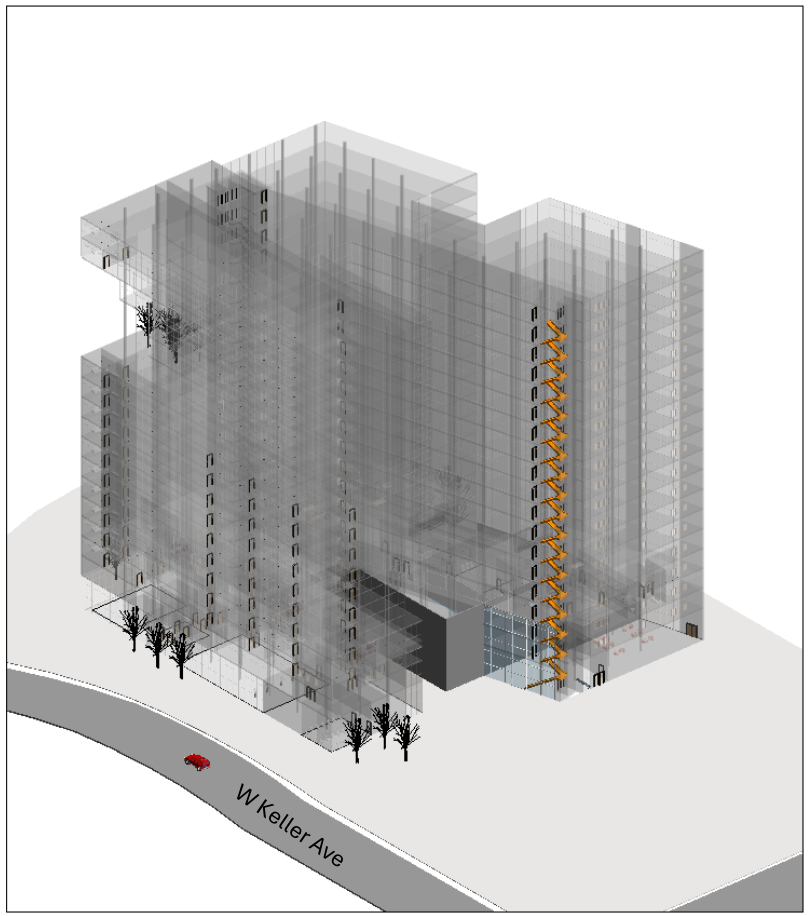
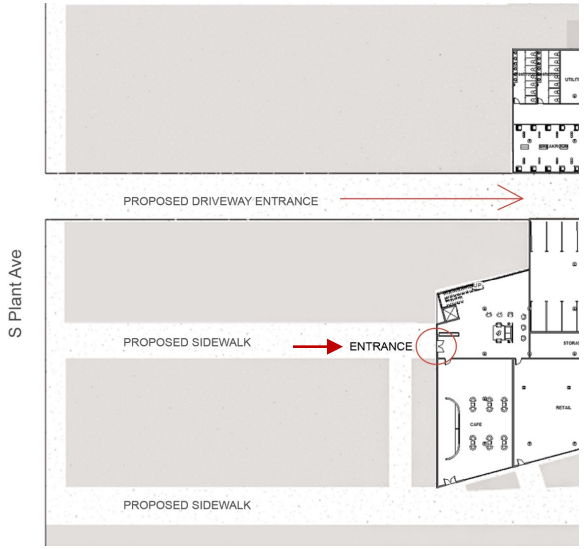
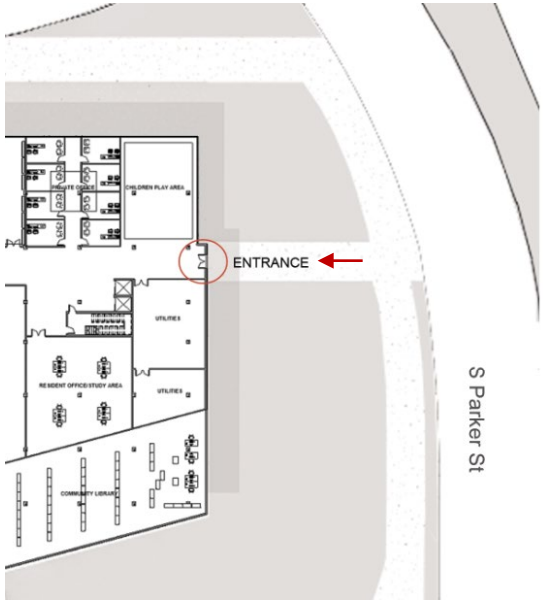


VERTICAL CIRCULATION - FIRESTAIRS | ELEVATORS



LEVEL 1 ELEVATION -3-0”
ENTRANCE FROM S PLANT AVE



LEVEL 1 ELEVATION -5-0”
ENTRANCE FROM S PARKER ST

FLOOR PLANS

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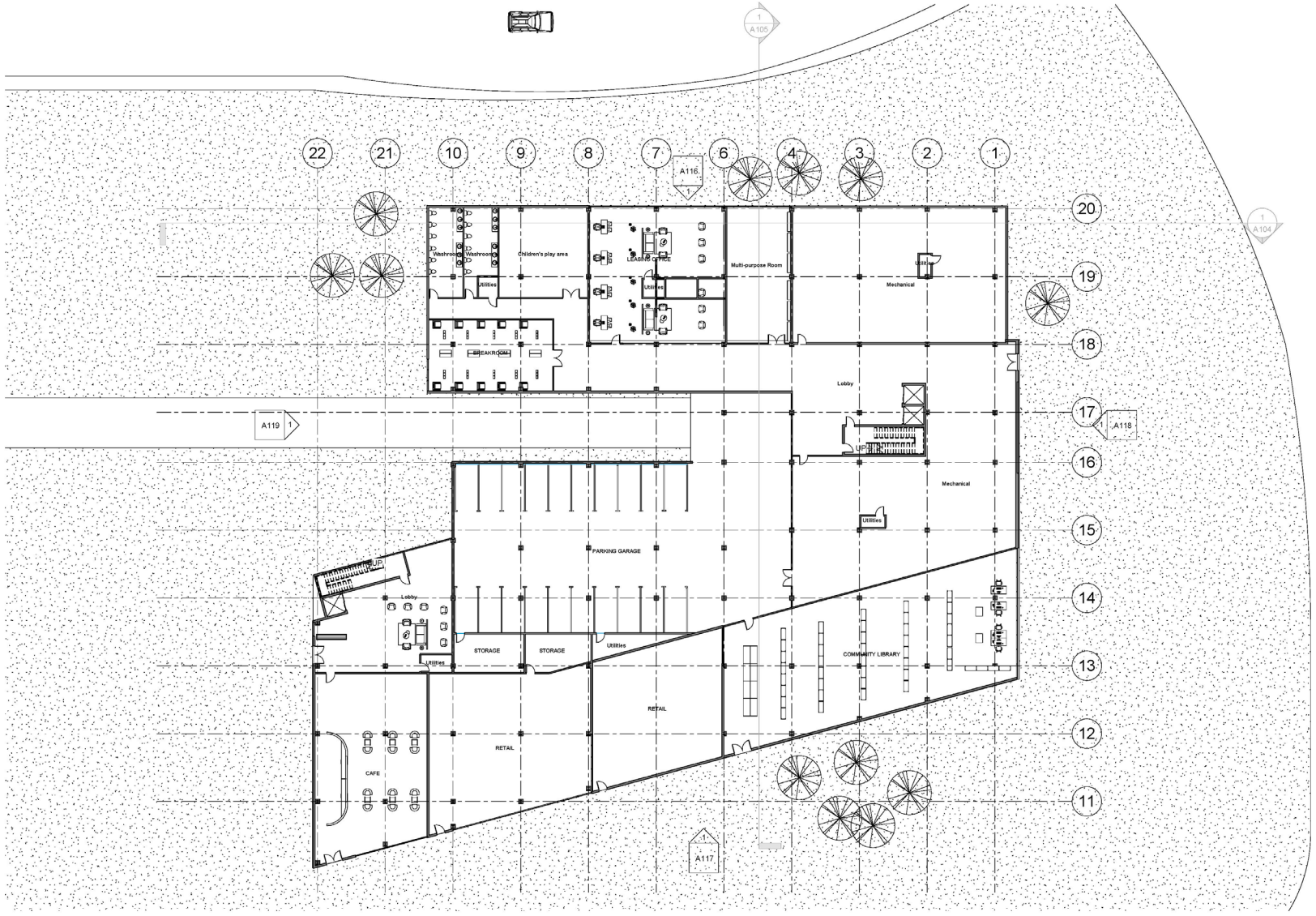
LEVEL 01 - FLOORPLAN

A101



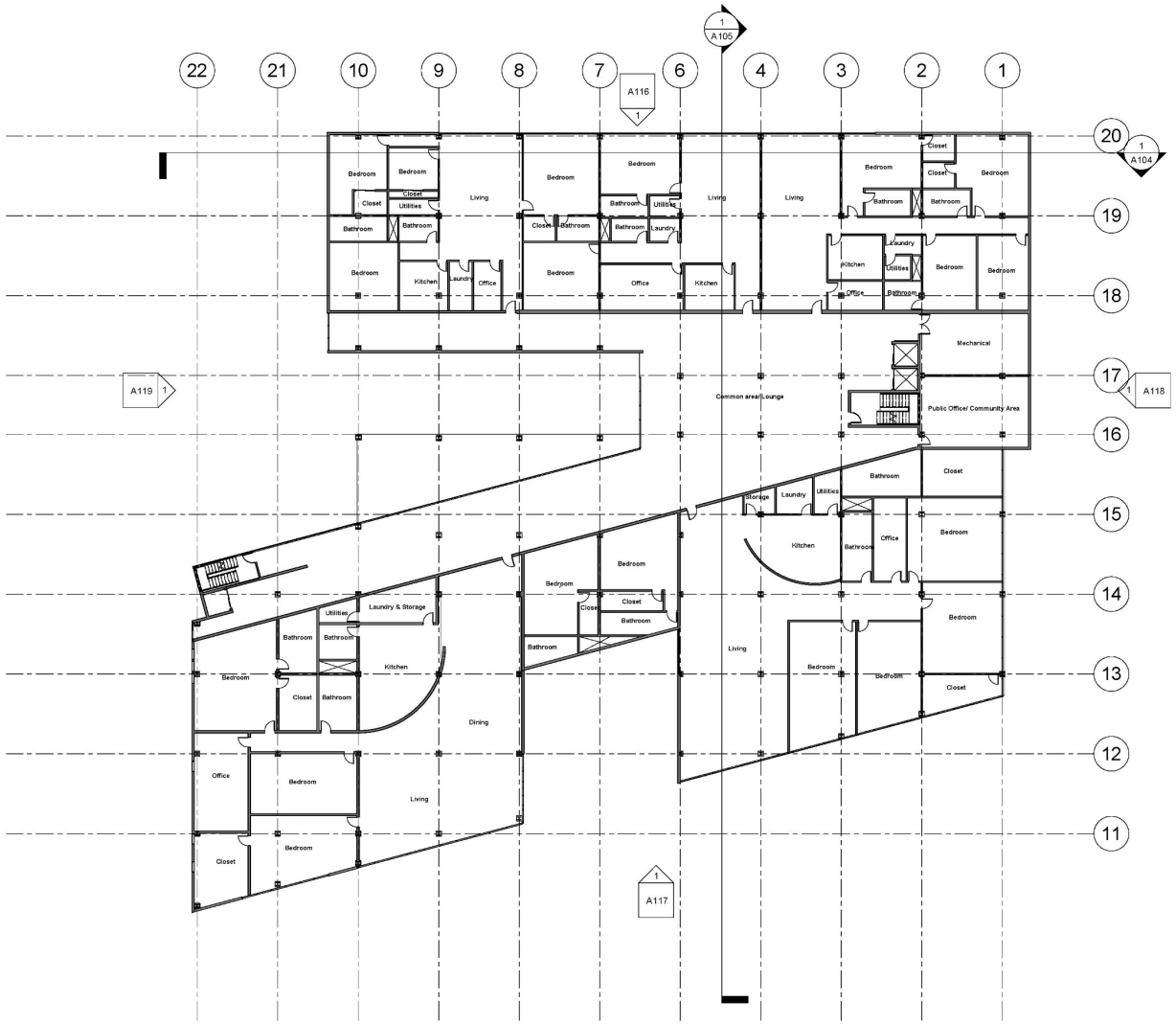
Jingying Zheng Jennifer

N

1" = 20'-0"

LEVEL 1

Café
Retails
Community library
Resident office | study area
Children area
Leasing office
Club house | break room
Washroom
Utilities
Storage
Parking garage (extended to level 5)



LEVEL 6 – 13

Living
Dining
Kitchen
Master bedroom
Guest bedroom
Office
Laundry
Bathroom
Walk-in closet
Storage

Jingying Zheng Jennifer

N

1" = 20'-0"

ELEVATIONS

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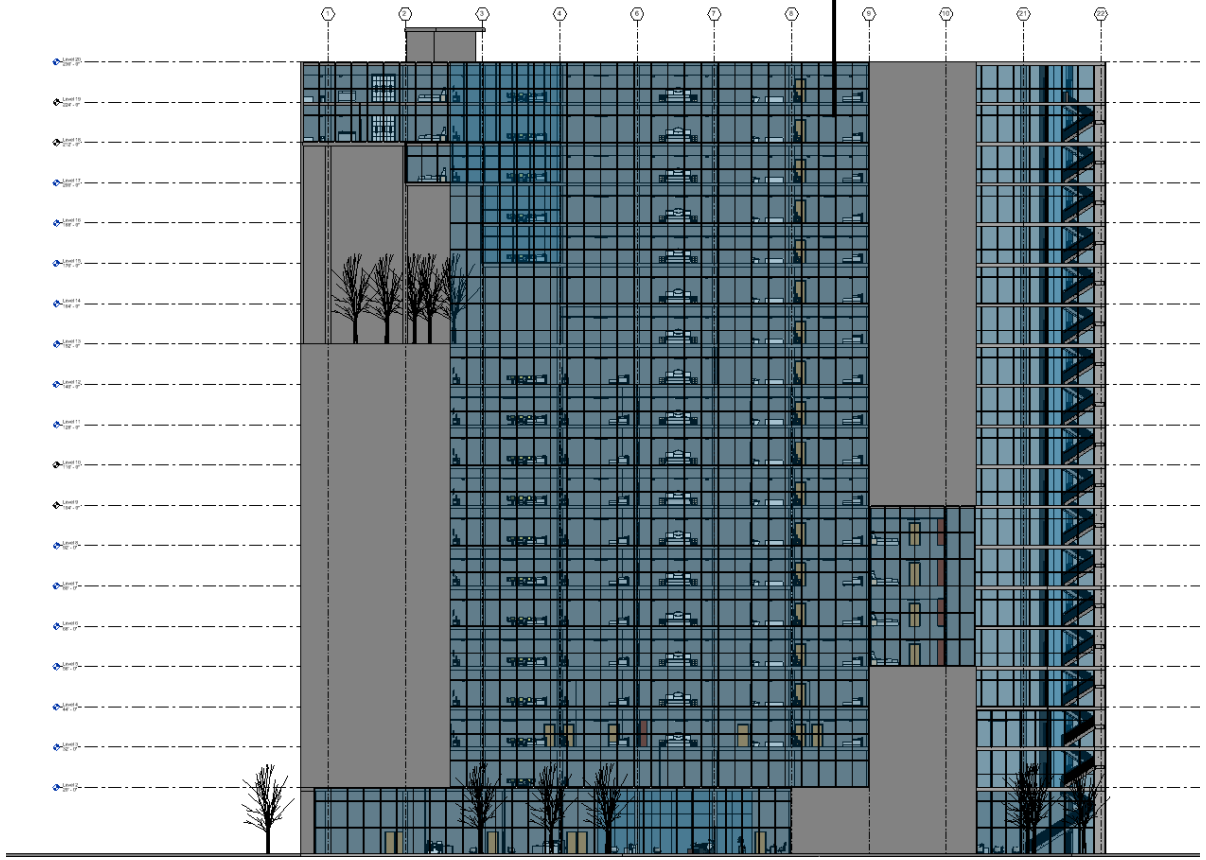
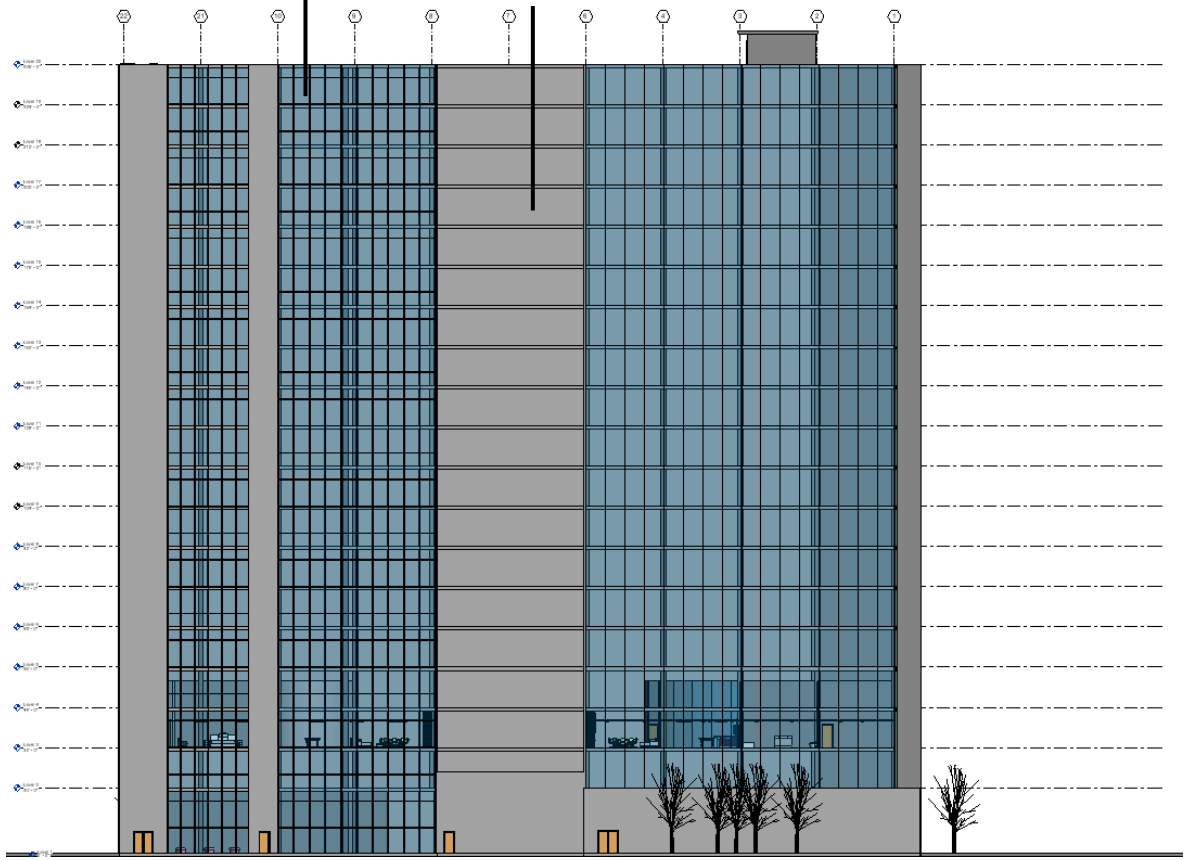
CURTAIN WALL
(ASTM A500 Grade B structural steel +
Double-glazed IGUs with Low E coating)

EXTERIOR WALL
(12" precast reinforced concrete + smooth form finish + vapor barrier + rigid insulation + interior gypsum board finish)



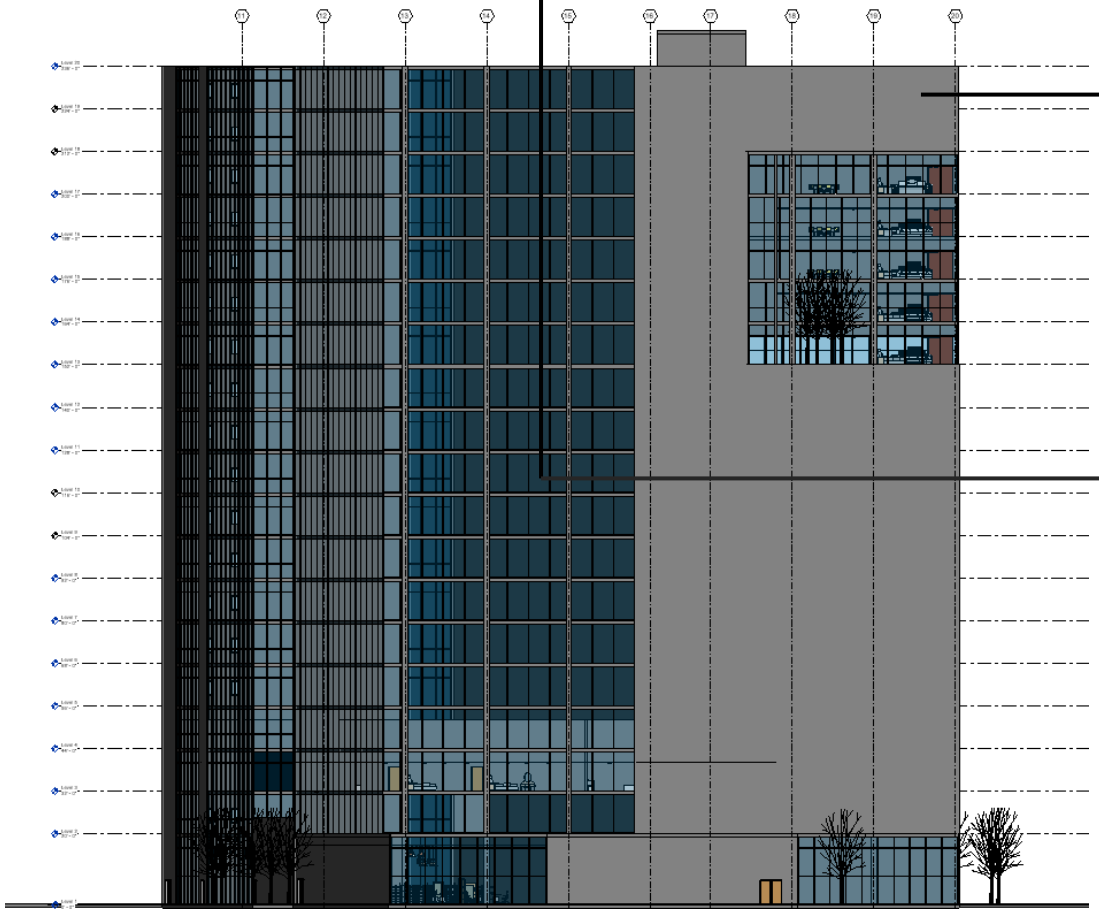
NORTH ELEVATION SCALE 1" = 300' – 0"



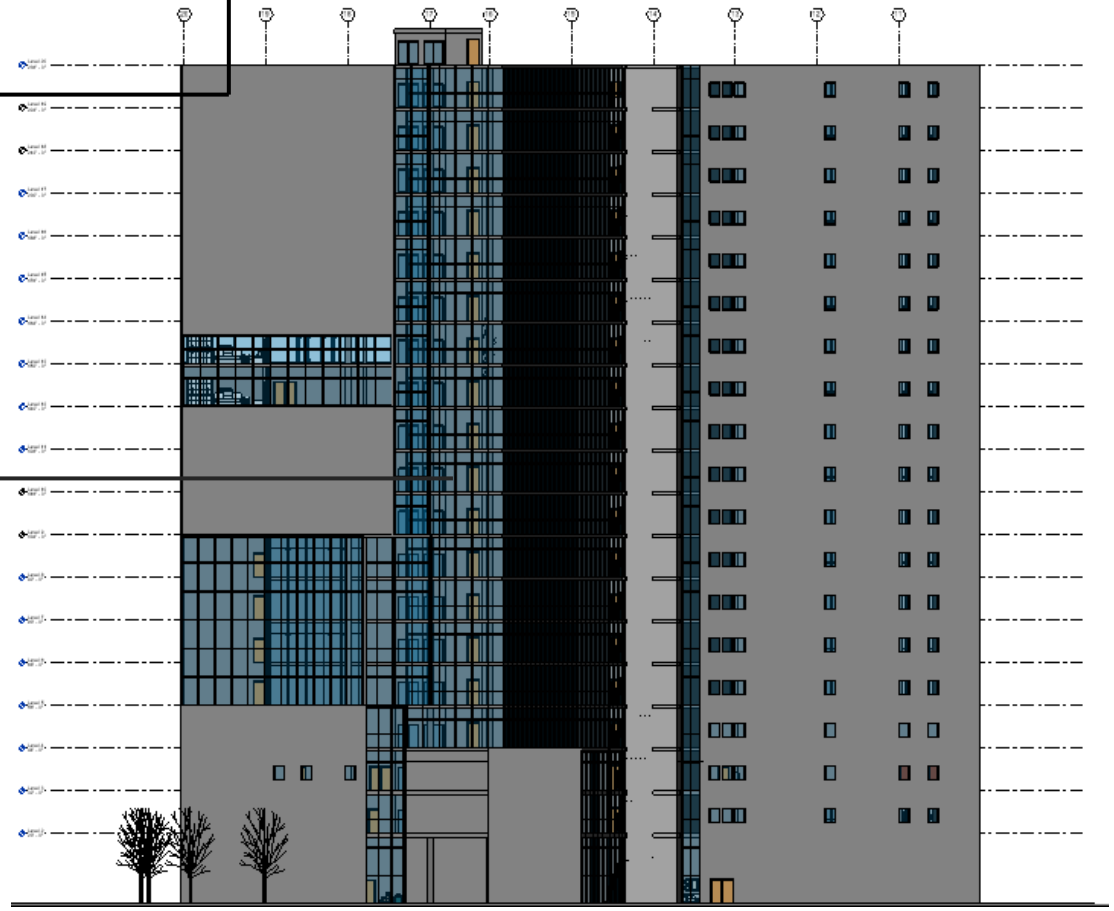
SOUTH ELEVATION SCALE 1" = 300' – 0"

CURTAIN WALL
(ASTM A500 Grade B structural steel +
Double-glazed IGUs with Low E coating)

EXTERIOR WALL
(12" precast reinforced concrete + smooth form finish + vapor barrier + rigid insulation + interior gypsum board finish)



EAST ELEVATION SCALE 1" = 300' – 0"



WEST ELEVATION SCALE 1" = 300' – 0"

SECTIONS

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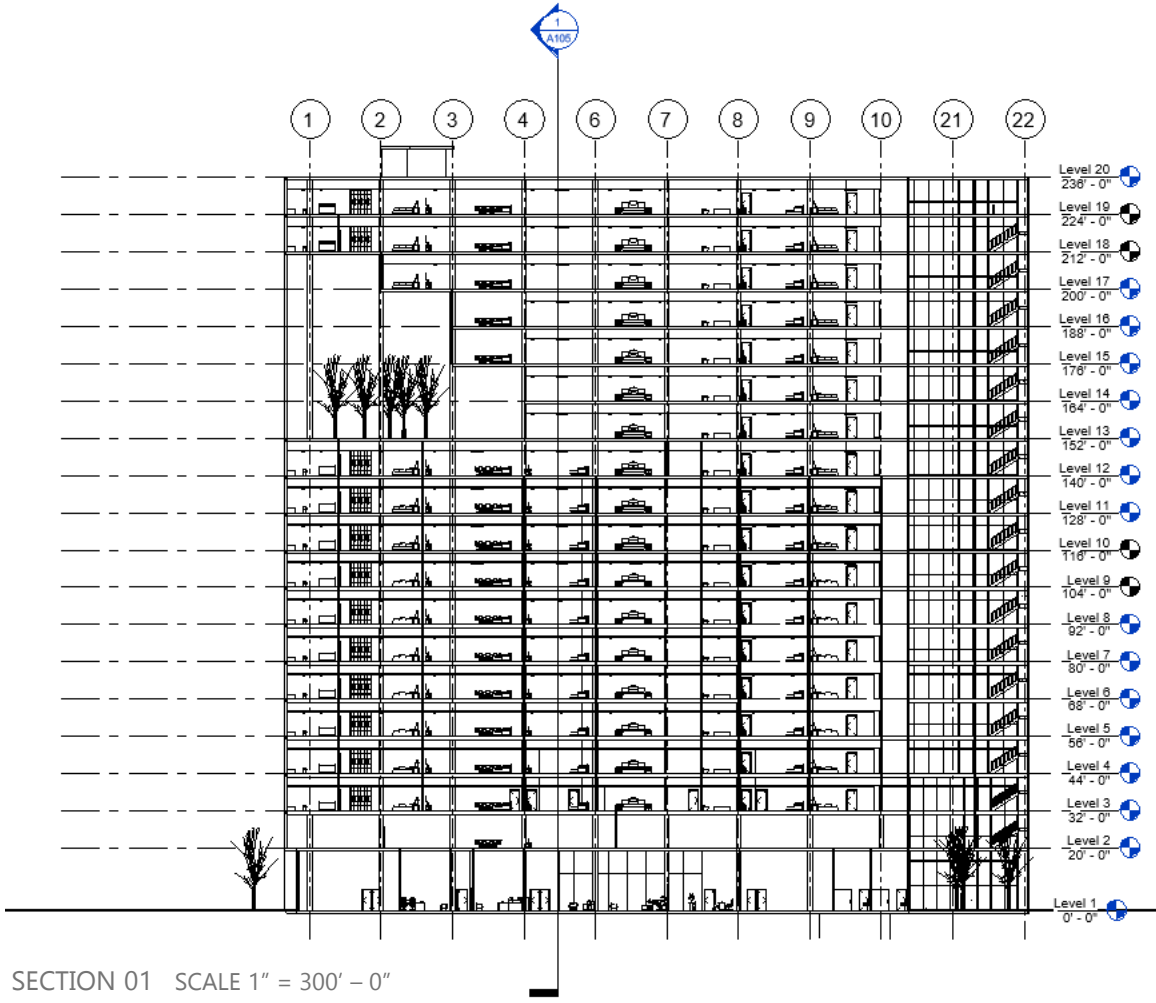
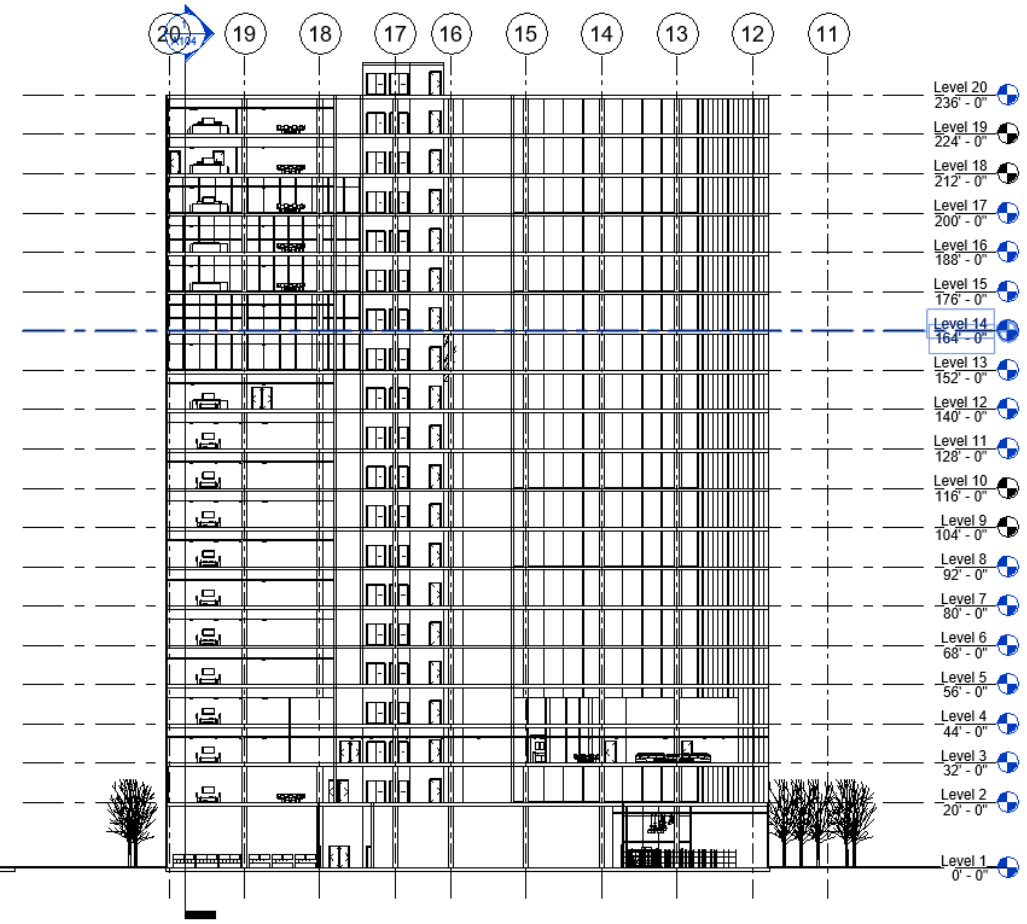


SECTION 01 SCALE 1" = 300' – 0"



SECTION 02 SCALE 1" = 300' – 0"

STRUCTURAL SYSTEM

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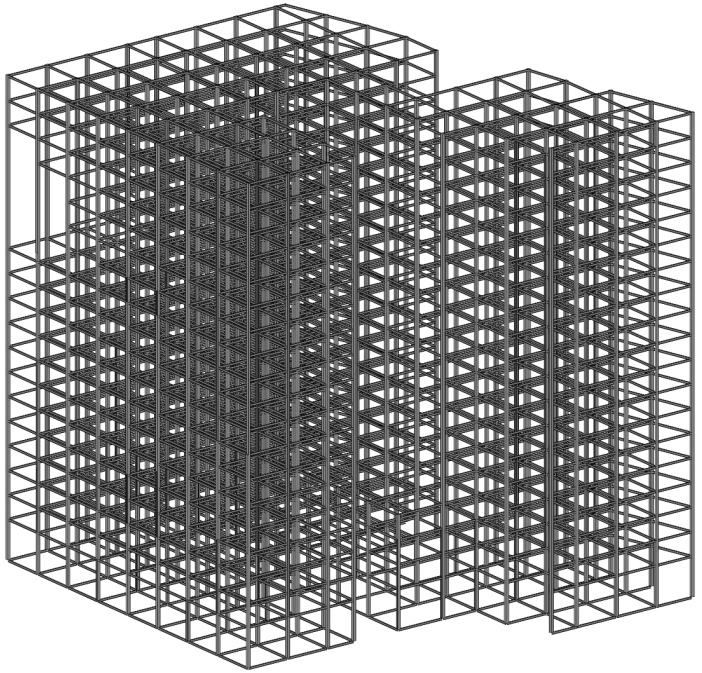
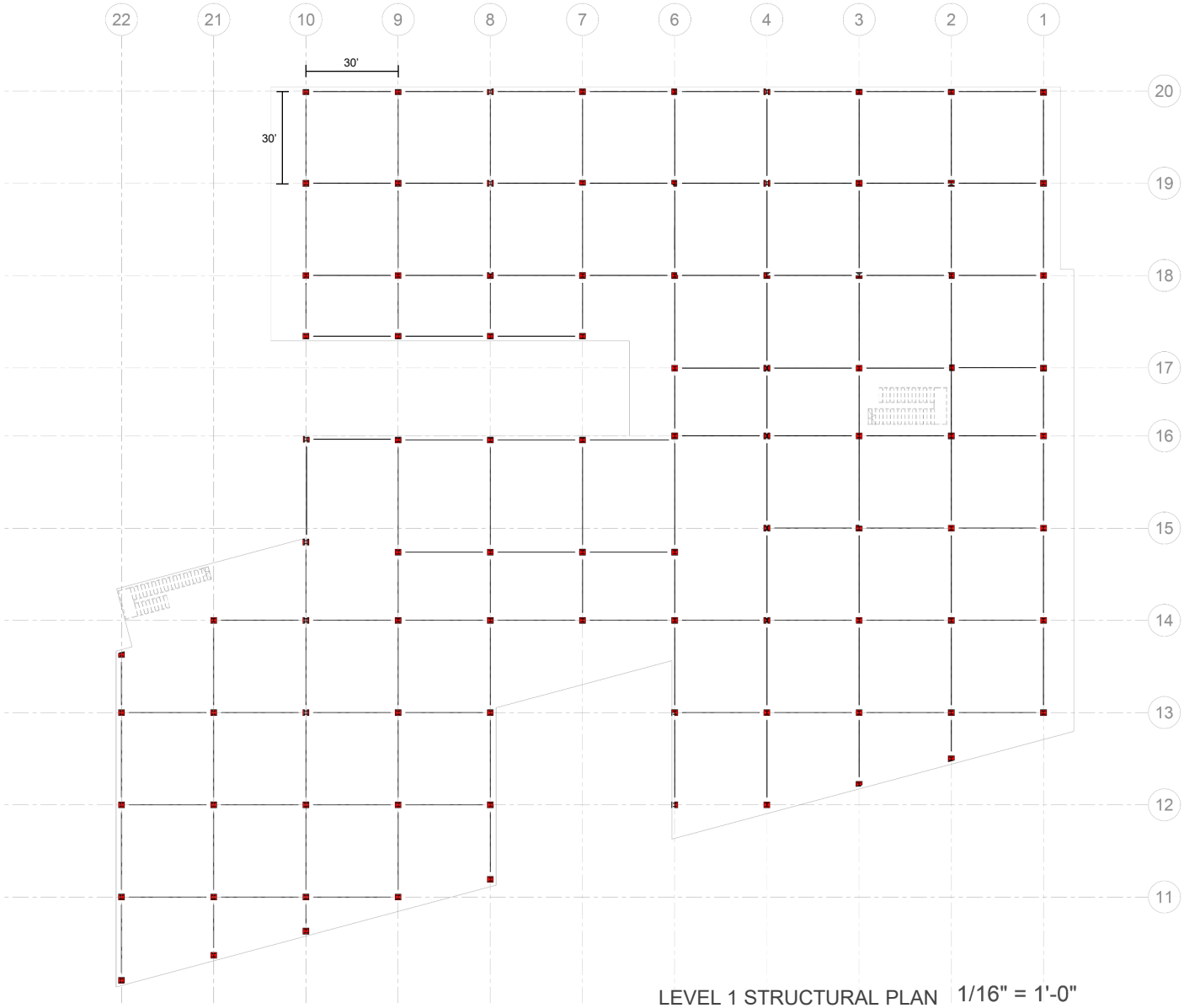
The building structure features a large steel frame and column system integrated with reinforced concrete shear walls and concrete floor slab.

The building is enclosed an envelope consists of aluminum-frame curtain wall with double-glazed insulated glass panels and precast concrete panels.

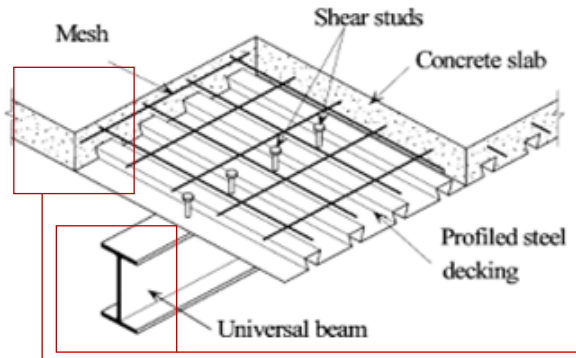


STRUCTURAL FRAME AXONOMETRIC

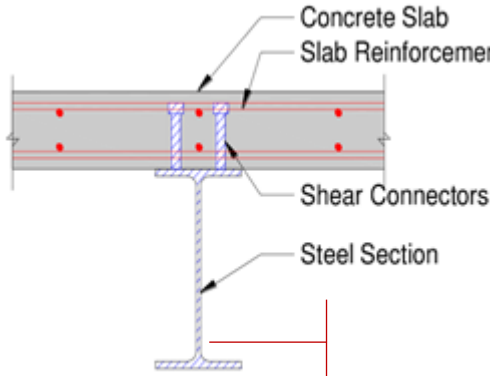


LEVEL 1 STRUCTURAL PLAN 1/16" = 1'-0"

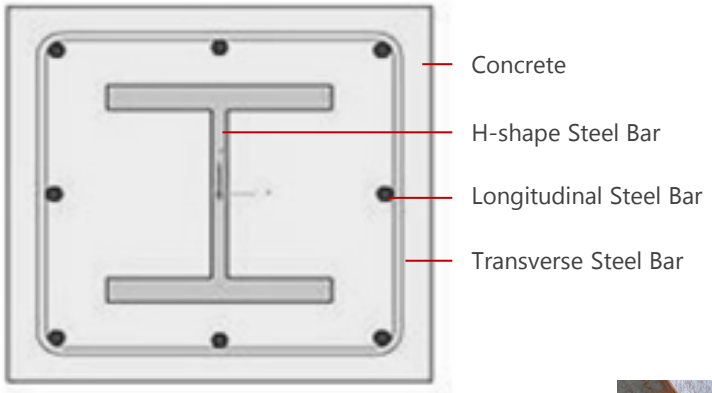
STRUCTURAL FRAME SYSTEM



COMPOSITE SLAB COMPONENTS

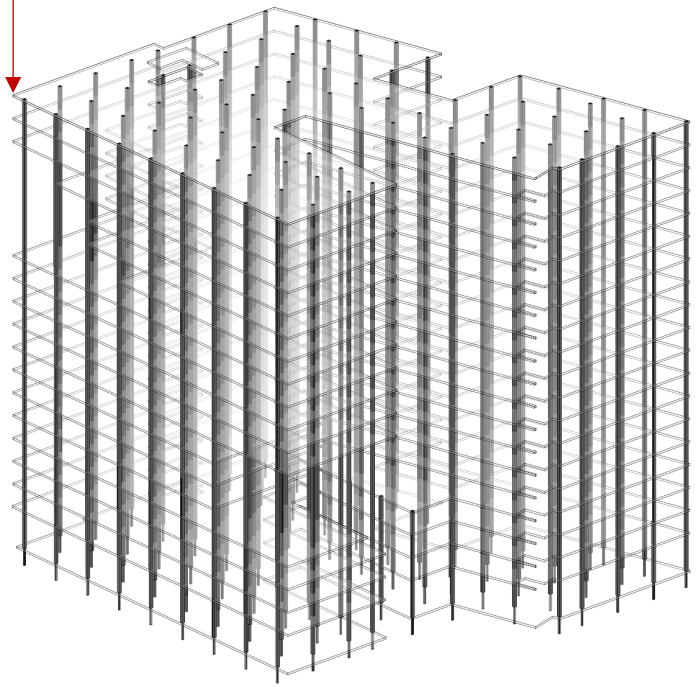


COMPOSITE BEAM DETAIL

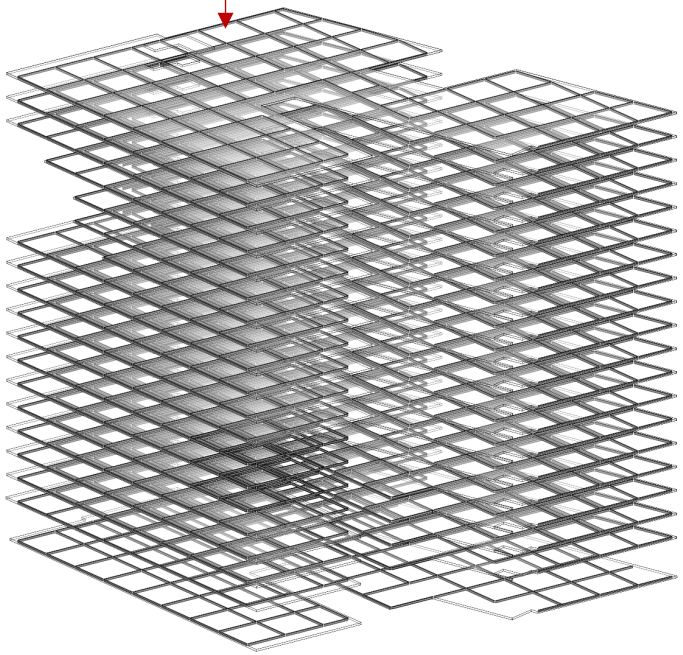


CONCRETE-ENCASED STEEL BEAM SECTION

BEAM JOINTS CLOSE - UP VIEW



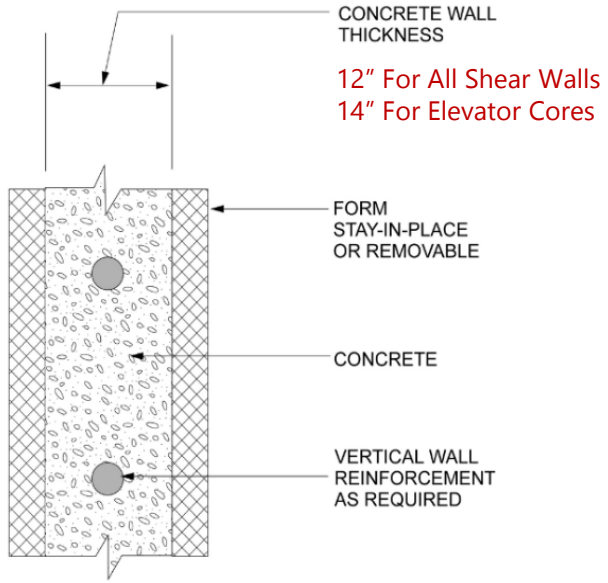
STRUCTURAL FRAME - COLUMNS



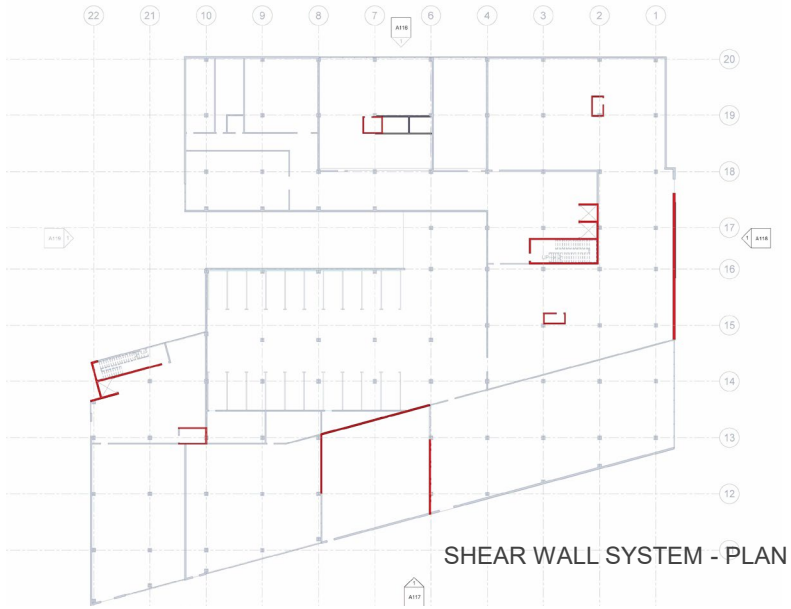
STRUCTURAL FRAME - BEAMS

The primary vertical structure consists of composite columns, made from W14×90 steel wide-flange sections encased in concrete, providing high axial load capacity and inherent fire resistance. The floor framing system uses W18×40 composite steel beams, with reinforced concrete slabs spanning on top, creating a stiff and efficient structural floor. Concrete shear walls located around the elevator core and stairwells provide lateral stability against seismic loads, completing the building's hybrid steel-concrete structural system.

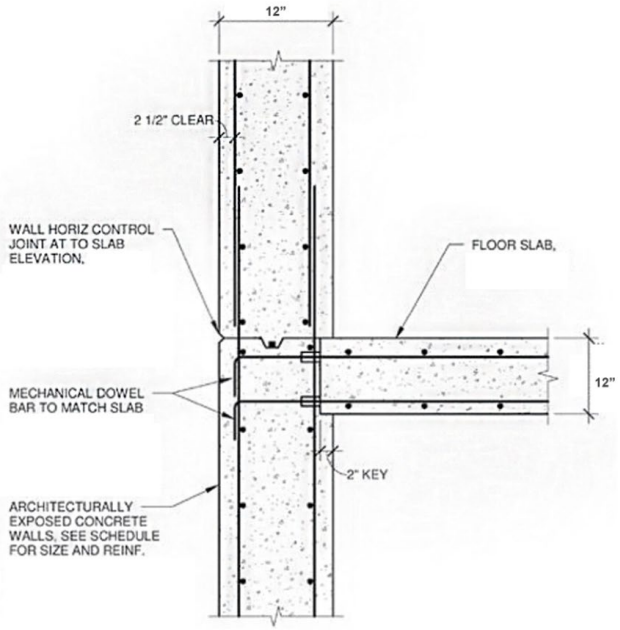
SHEAR WALL SYSTEM



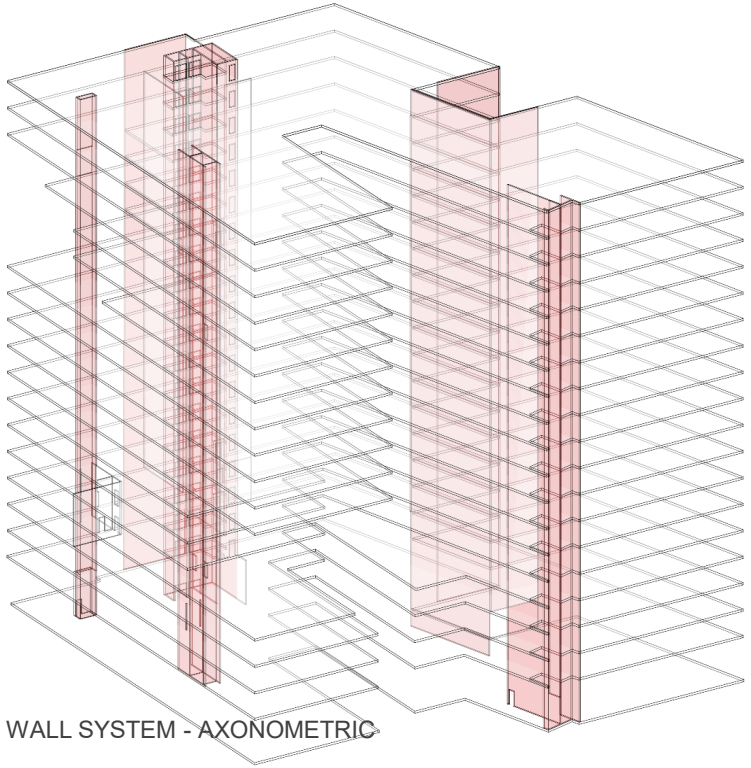
CONCRETE SHEAR WALL SECTION ENLARGED DETAIL



SHEAR WALL SYSTEM - PLAN


12"
2 1/2" CLEAR
WALL HORIZ CONTROL JOINT AT TO SLAB ELEVATION.
FLOOR SLAB.
12"
MECHANICAL DOWEL BAR TO MATCH SLAB
2" KEY
ARCHITECTURALLY EXPOSED CONCRETE WALLS, SEE SCHEDULE FOR SIZE AND REINF.

CONCRETE SHEAR WALL SECTION DETAIL



SHEAR WALL SYSTEM - AXONOMETRIC

The building's shear walls are constructed of 12-inch thick cast-in-place concrete, providing essential lateral stability against wind and seismic forces. These walls are located along the exterior and around the elevator core and stairwells to maximize structural efficiency. The walls feature a smooth formwork finish, offering a clean appearance where exposed. The concrete walls are reinforced with double layers of vertical and horizontal rebar on center, with additional boundary reinforcement at the wall ends to resist high stress concentrations. The shear walls are anchored into the floor slabs and foundation system to ensure continuous load transfer throughout the tower structure.

FOOTING/FOUNDATION SYSTEM

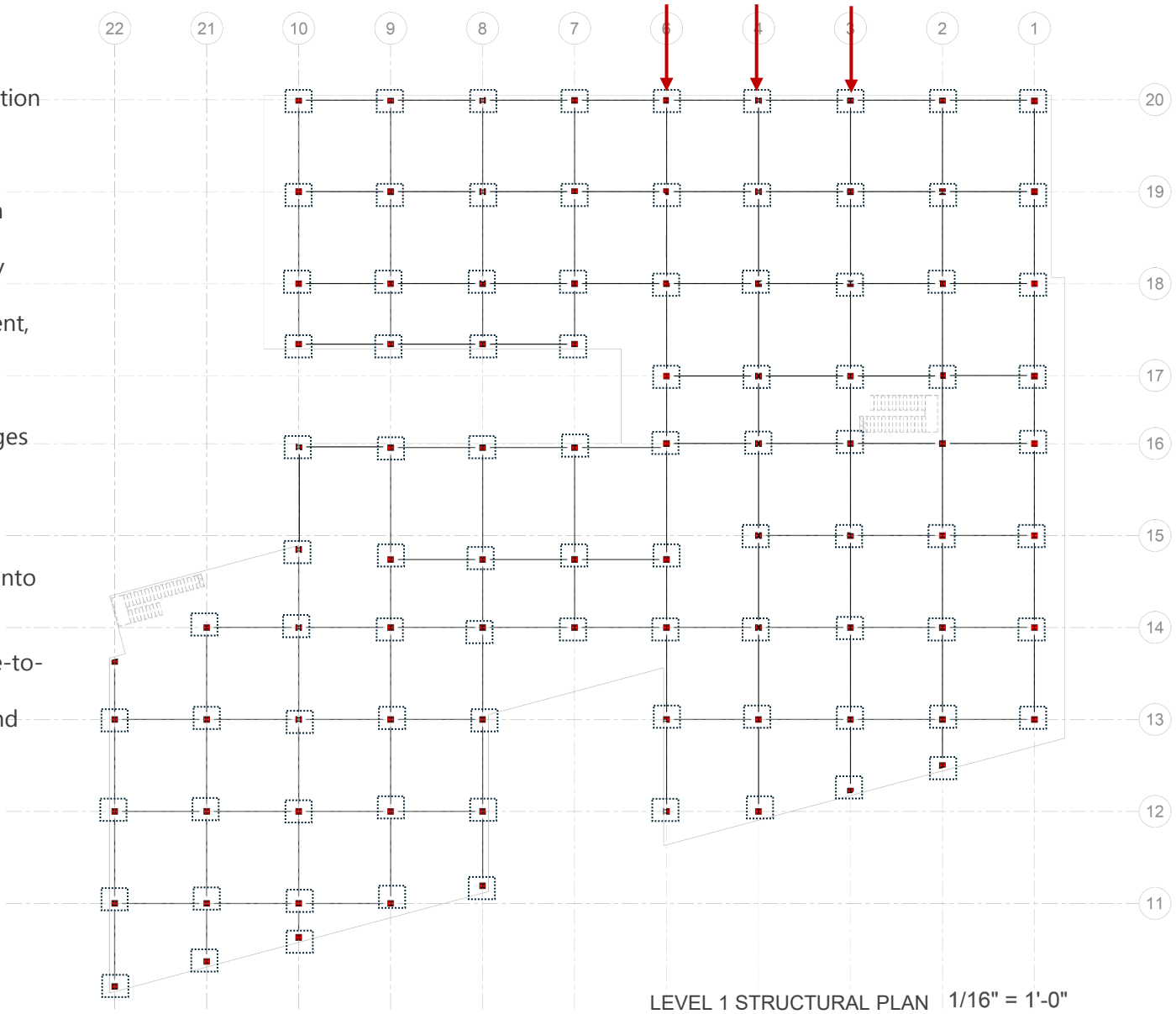
Pile Raft foundations

For the 20-story residential tower located in Tampa, Florida, a pile raft foundation system is the most appropriate choice due to local subsurface conditions, including loose to medium-dense sandy soils and the risk of differential settlement. This system combines a reinforced concrete raft (or pile cap) with discrete deep piles strategically placed directly beneath the building's column lines and core shear wall zones. The raft distributes vertical and lateral forces, while the piles provide deep bearing support and limit settlement, particularly under high-load structural elements. This integrated system enhances overall stiffness and performance, especially important in Tampa's coastal environment, where wind uplift and flood resilience are critical design factors.

Specification:

- Piles - Reinforced concrete piles, 30" diameter, cast-in-place with rebar cages
- Pile arrangement - Aligned directly beneath column grid and core wall footings
- Pile depth – 70' below ground, designed to reach dense strata; depth determined by geotechnical report
- Pile head reinforcement - Grade 60 steel dowels, extended from pile caps into raft
- Raft/Pile cap – 30" thick reinforced concrete raft slab
- Load transfer mechanism - Axial and lateral forces transferred through pile-to-column dowels
- Lateral load resistance - Enhanced by pile grouping beneath shear walls and cores

30" reinforced concrete piles



LEVEL 1 STRUCTURAL PLAN 1/16" = 1'-0"

FOUNDATION DETAIL A129

1 6" REINFORCED CONCRETE SLAB OVER 2" COMPOSITE METAL DECK ON W14 X 90 STEEL BEAMS WITH WELDED SHEAR STUDS FOR FULL COMPOSITE ACTION.

2 10" THICK REINFORCED CONCRETE STRUCTURAL SLAB WITH TOP AND BOTTOM LAYERS OF #9 REBAR AT 8" O.C. EACH WAY, SPANNING BETWEEN PILE CAPS SUPPORTED BY 30"Ø DRILLED CONCRETE PILES

3 WATERPROOF MEMBRANE

4 PILE CAP

5 SLOPED FINISH GRADE TO DRAIN SURFACE WATER AWAY FROM FOUNDATION

6 STONE PAD

7 FOUNDATION DRAINAGE @ 3"Ø

8 30" Ø DRILLED SHAFT, 70 FT DEPTH WITH FULL-LENGTH REBAR CAGE

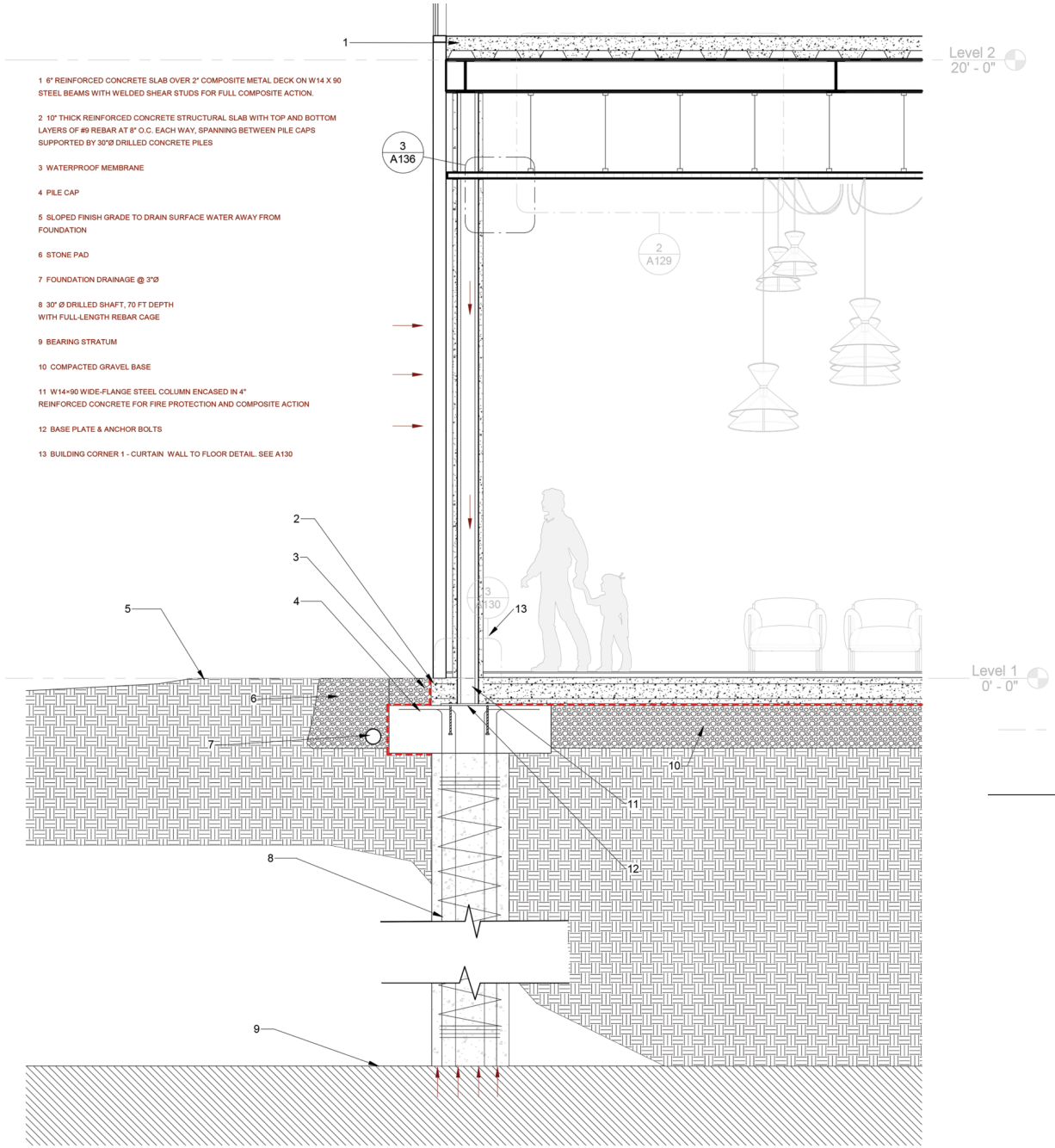
9 BEARING STRATUM

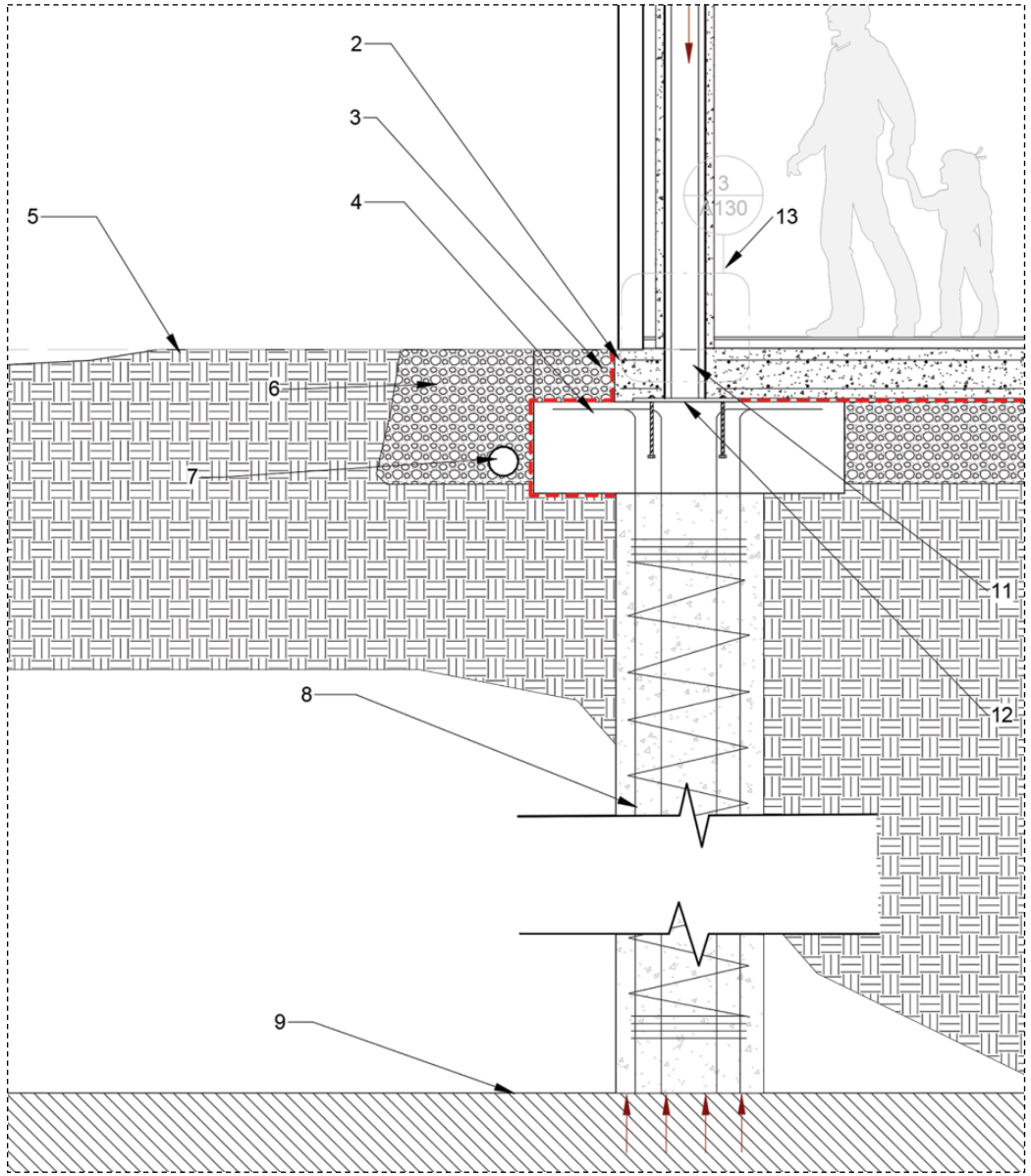
10 COMPACTED GRAVEL BASE

11 W14×90 WIDE-FLANGE STEEL COLUMN ENCASED IN 4" REINFORCED CONCRETE FOR FIRE PROTECTION AND COMPOSITE ACTION

12 BASE PLATE & ANCHOR BOLTS

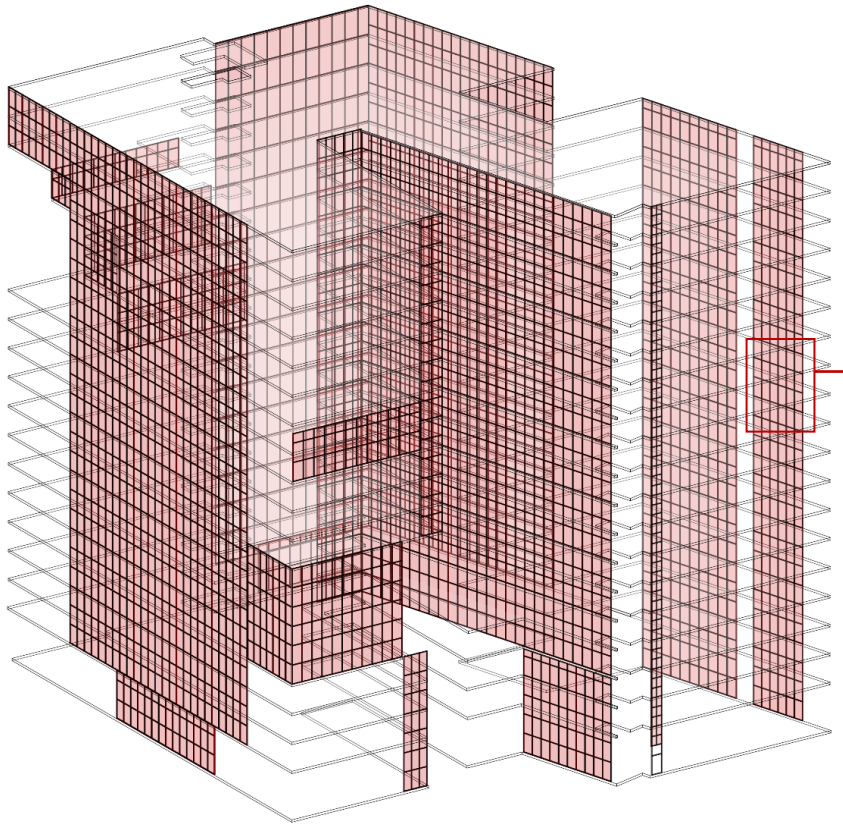
13 BUILDING CORNER 1 - CURTAIN WALL TO FLOOR DETAIL. SEE A130

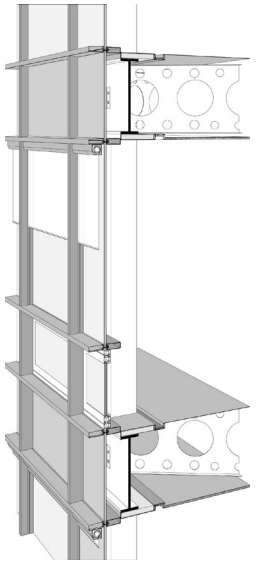


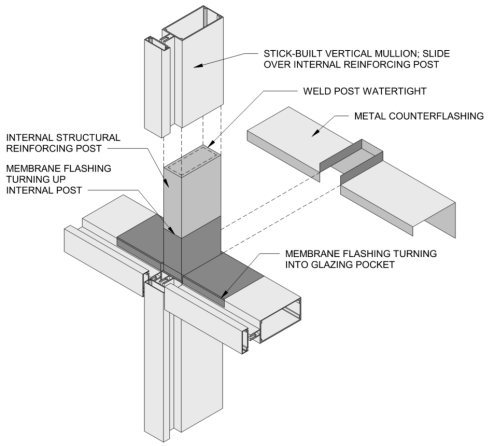


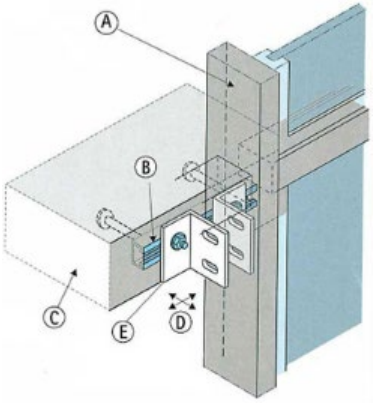
1 BUILDING SECTION DETAIL
3/8" = 1'-0"

CURTAIN WALL SYSTEM



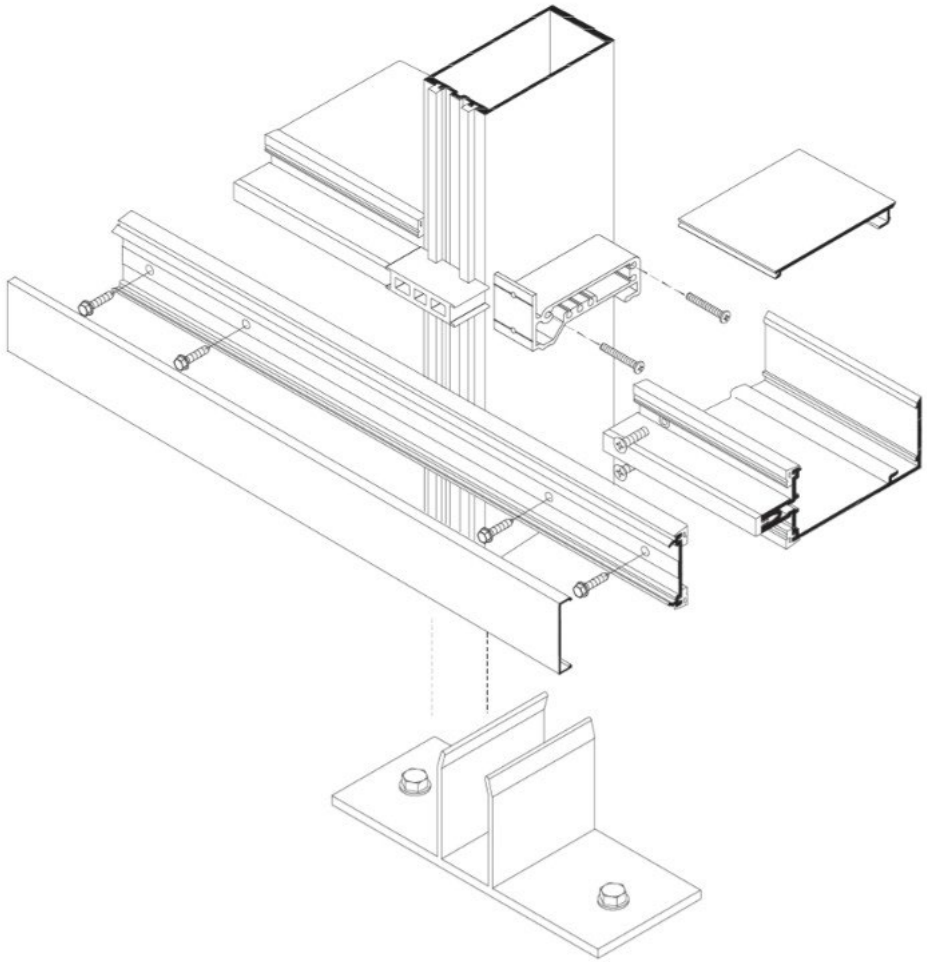



STICK-BUILT VERTICAL MULLION; SLIDE OVER INTERNAL REINFORCING POST
WELD POST WATERTIGHT
METAL COUNTERFLASHING
INTERNAL STRUCTURAL REINFORCING POST
MEMBRANE FLASHING TURNING UP INTERNAL POST
MEMBRANE FLASHING TURNING INTO GLAZING POCKET



Detail of curtainwall application.
A- Curtainwall.
B- Halfen cast-in channel.
C- Reinforced concrete slab.
D- Adjustment.
E- Angle supplied by client bolted to channel with Halfen hammerhead bolts and nuts.

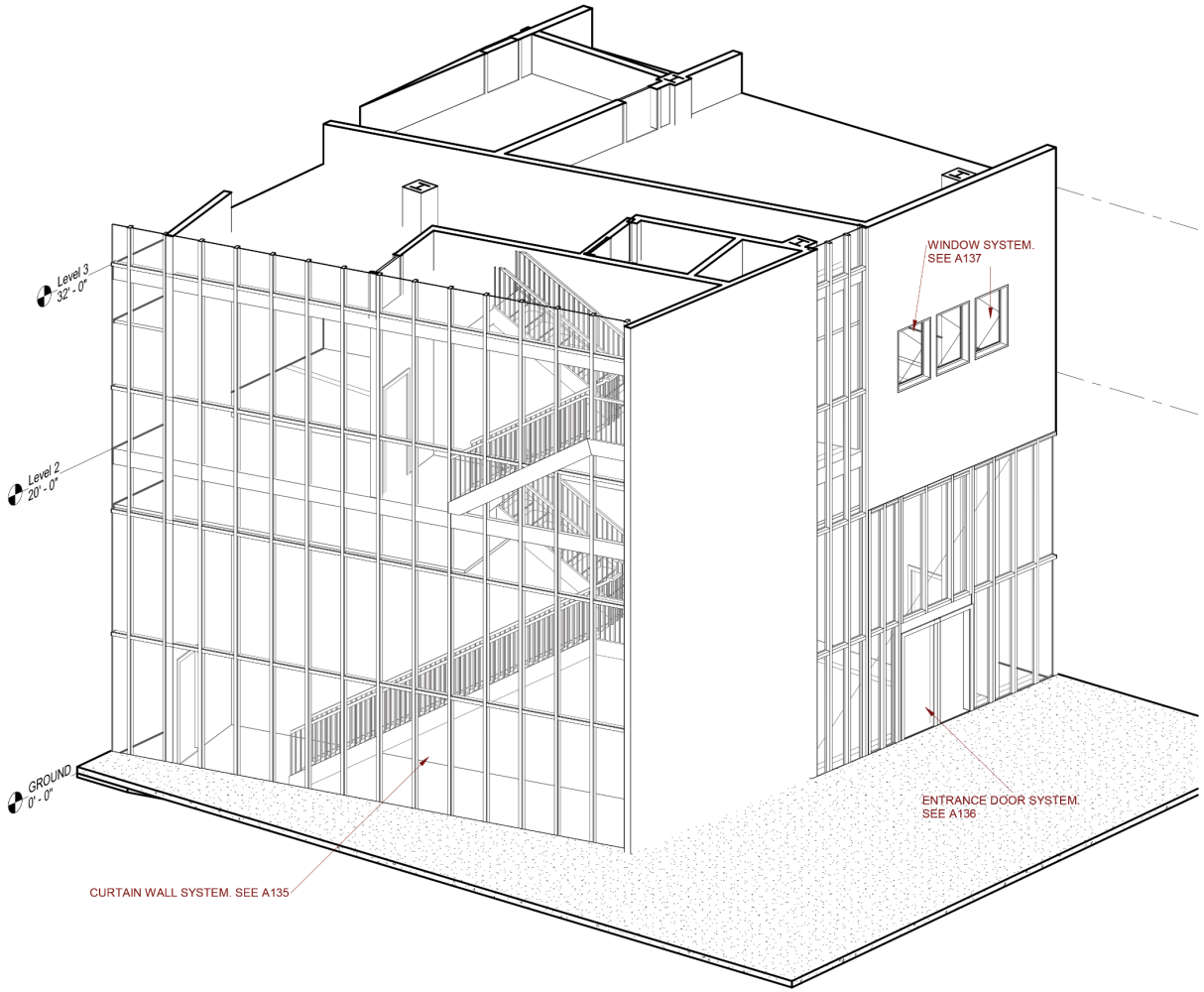
CURTAIN WALL SYSTEM - AXONOMETRIC



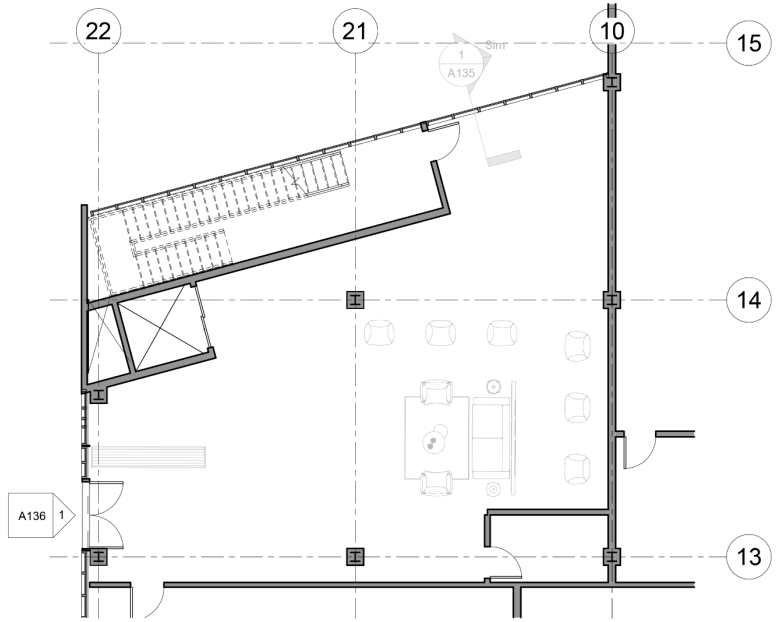
CURTAIN WALL: **KAWNEER 1600 WALL SYSTEM®2 CURTAIN WALL**

- 2-1/2″ (63.5mm) sightline
- 6″ (152.4mm), 7-1/2″ (190.5mm) or 10-1/2″ (267mm) depth
- Thermal performance
- Low- to mid-rise applications
- Seismic (AAMA 501.4 and 501.6 standards)
- Vertical Structural Silicone Glazed (SSG), hurricane resistance

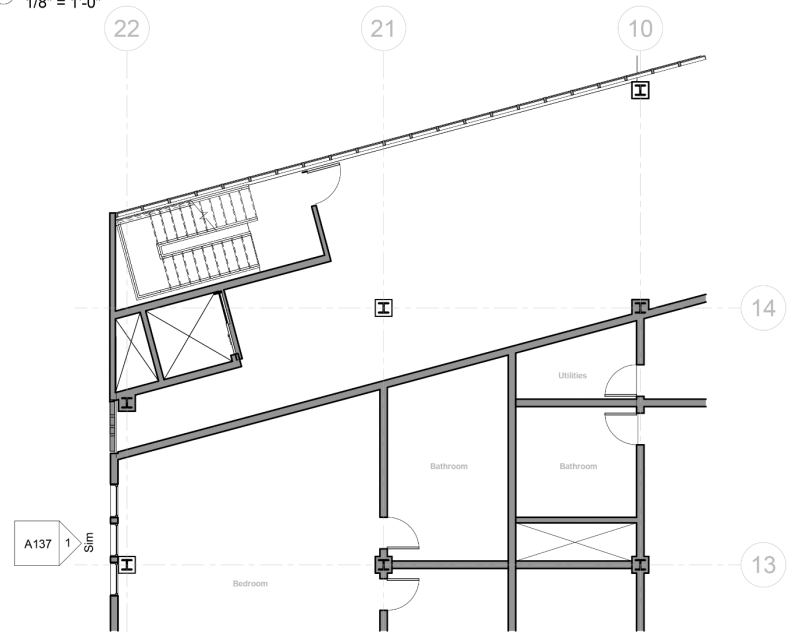
CURTAINWALL, WINDOW AND SPANDREL A134



1 EXTERIOR OPENINGS ISOMETRIC VIEW

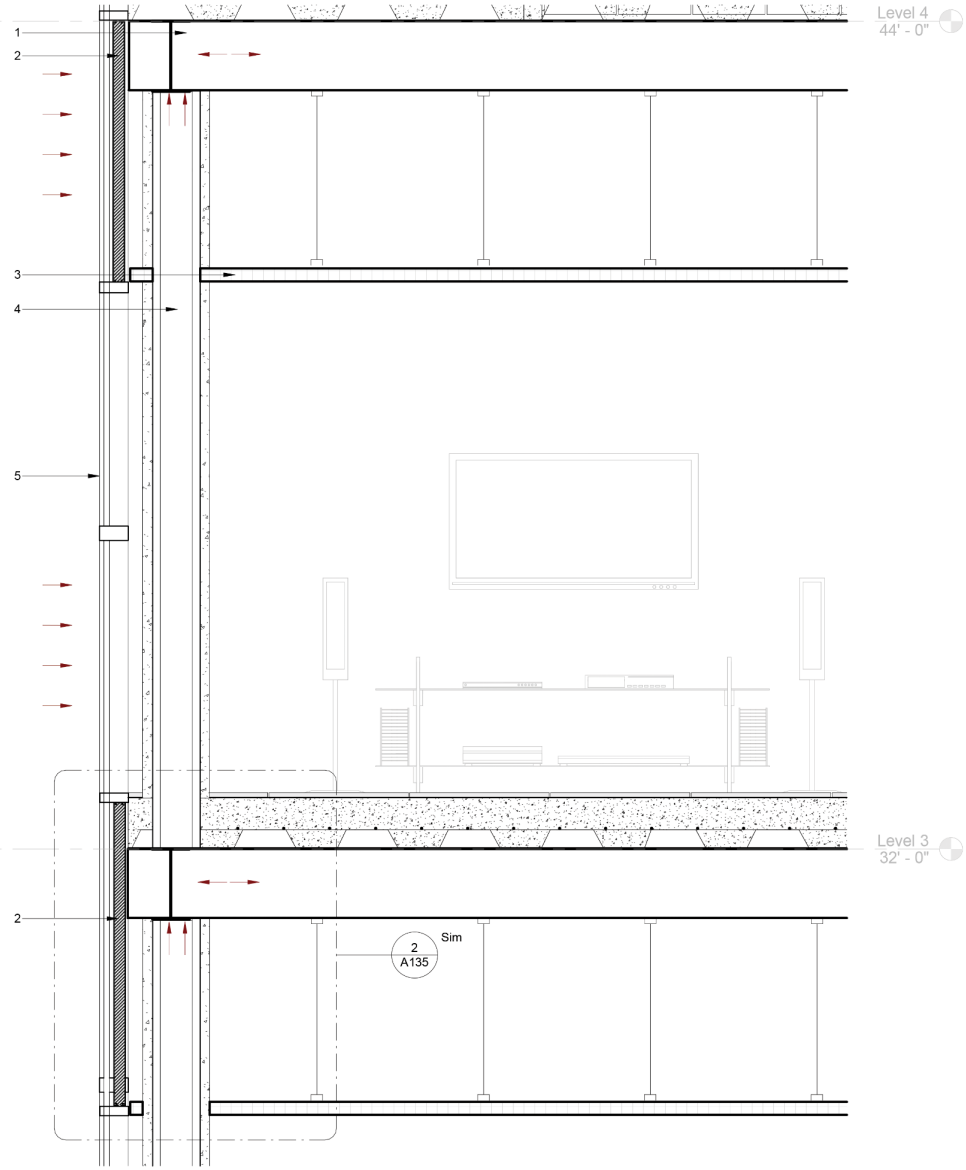


2 EXTERIOR OPENINGS KEY PLAN - LEVEL 1 ENTRANCE DOOR AND CURTAIN WALL
1/8" = 1'-0"



3 EXTERIOR OPENING KEY PLAN - LEVEL 2 - 19 WINDOW FRAME
1/8" = 1'-0"

EXTERIOR OPENING – CURTAIN WALL A135



1 STEEL BEAM. SEE A129 BUILDING SECTION CALLOUT 3 - FLOOR AND CEILING

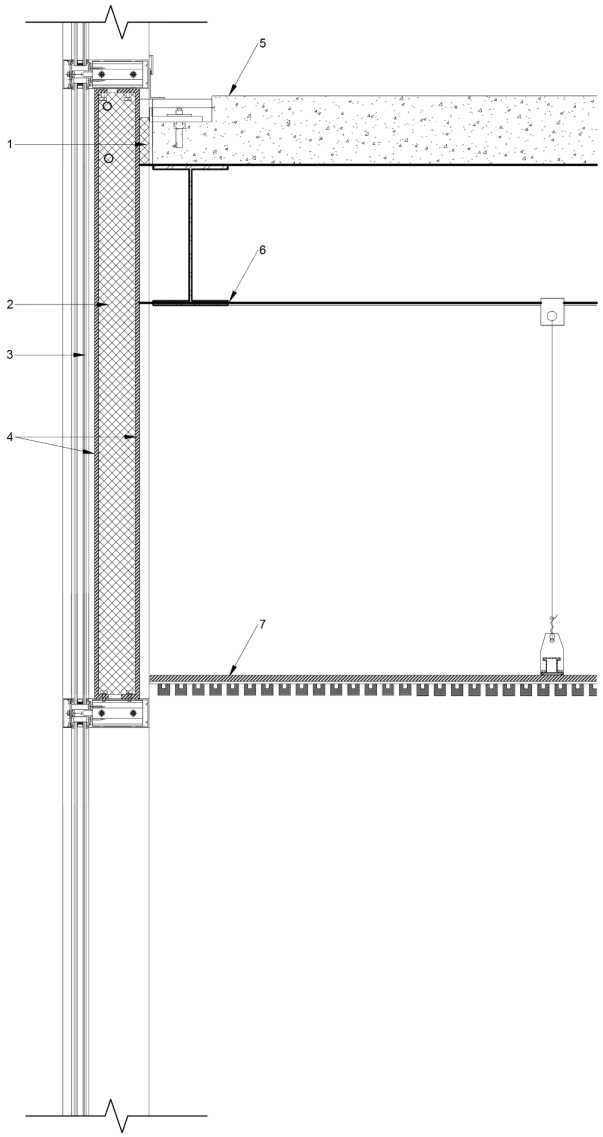
2 CURTAIN WALL SPANDREL SYSTEM. SEE A135 CALLOUT 1

3 CEILING ASSEMBLY SEE A129 BUILDING SECTION CALLOUT 3 - FLOOR AND CEILING

4 W14X90 WIDE-FLANGE STEEL COLUMN ENCASED IN 4" REINFORCED CONCRETE FOR FIRE PROTECTION AND COMPOSITE ACTION

5 1" INSULATED GLAZING GLASS CURTAIN WALL. ASSEMBLY SYSTEM SEE A130 BUILDING SECTION CALLOUT 2 - CURTAIN WALL TO FLOOR BUILDING CORNER

1 CURTAIN WALL SECTION
3/4" = 1'-0"



1 STEEL STUD - SLAB INTERSECTION

2 3 1/2" WOOL INSULATION

3 FRONT GLASS - SPANDREL PANEL

4 METAL BACKPAN

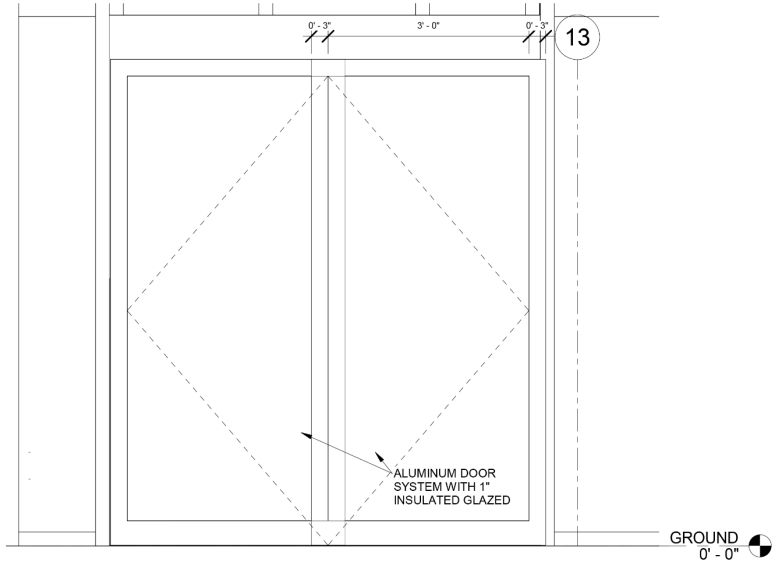
5 CONCRETE SLAB SEE CALLOUT 3 FOR DETAILS

6 STEEL BEAM SEE CALLOUT 3 FOR DETAILS

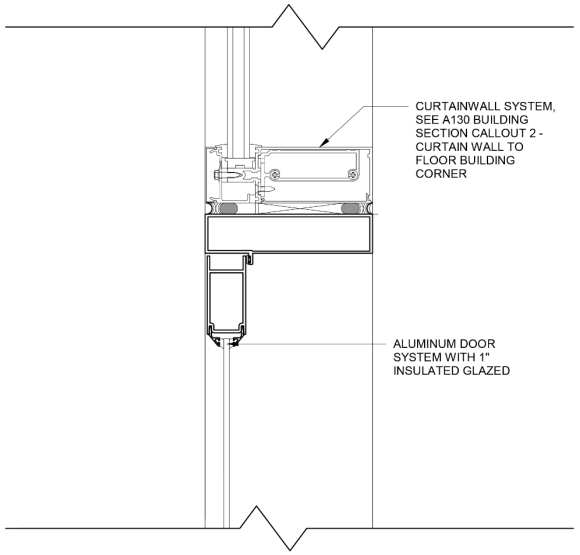
7 CEILING SYSTEM SEE CALLOUT 3 FOR DETAILS

2 CURTAIN WALL SECTION CALLOUT 1 - SPANDREL SYSTEM
1 1/2" = 1'-0"

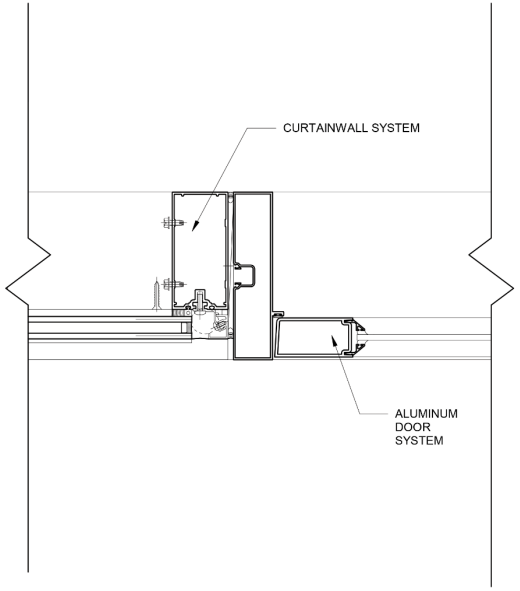
EXTERIOR OPENING – ENTRANCE DOOR A136



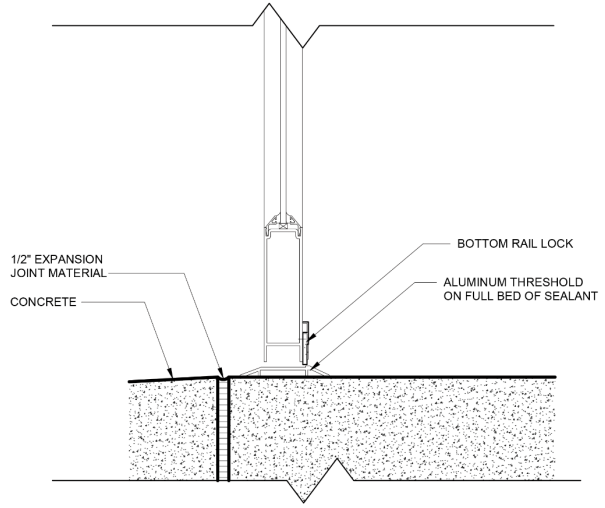
1 ENTRANCE DOOR ELEVATION
3/4" = 1'-0"


CURTAINWALL SYSTEM, SEE A130 BUILDING SECTION CALLOUT 2 - CURTAIN WALL TO FLOOR BUILDING CORNER
ALUMINUM DOOR SYSTEM WITH 1" INSULATED GLAZED

2 EXTERIOR ALUMINUM DOOR - HEAD
3" = 1'-0"

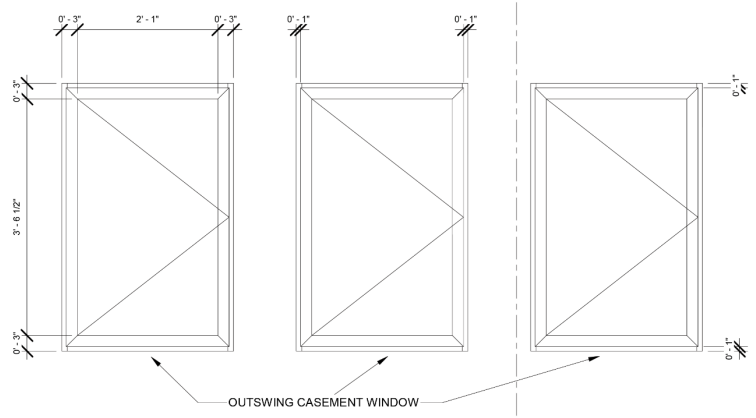


3 EXTERIOR ALUMINUM DOOR - JAMB
3" = 1'-0"

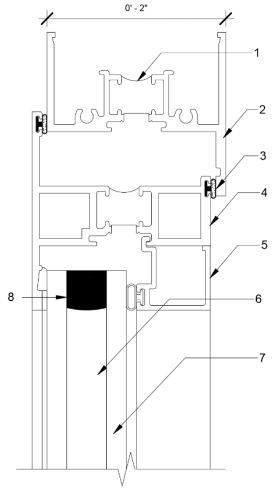


4 EXTERIOR ALUMINUM DOOR - SILL
3" = 1'-0"

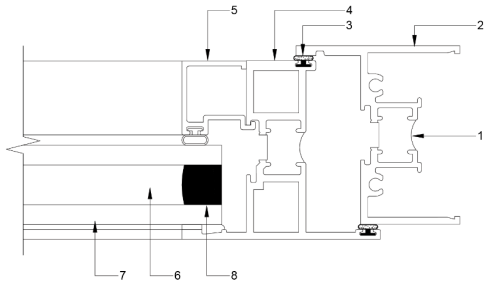
EXTERIOR OPENING – WINDOW A137



1 WINDOW ELEVATION
3/4" = 1'-0"

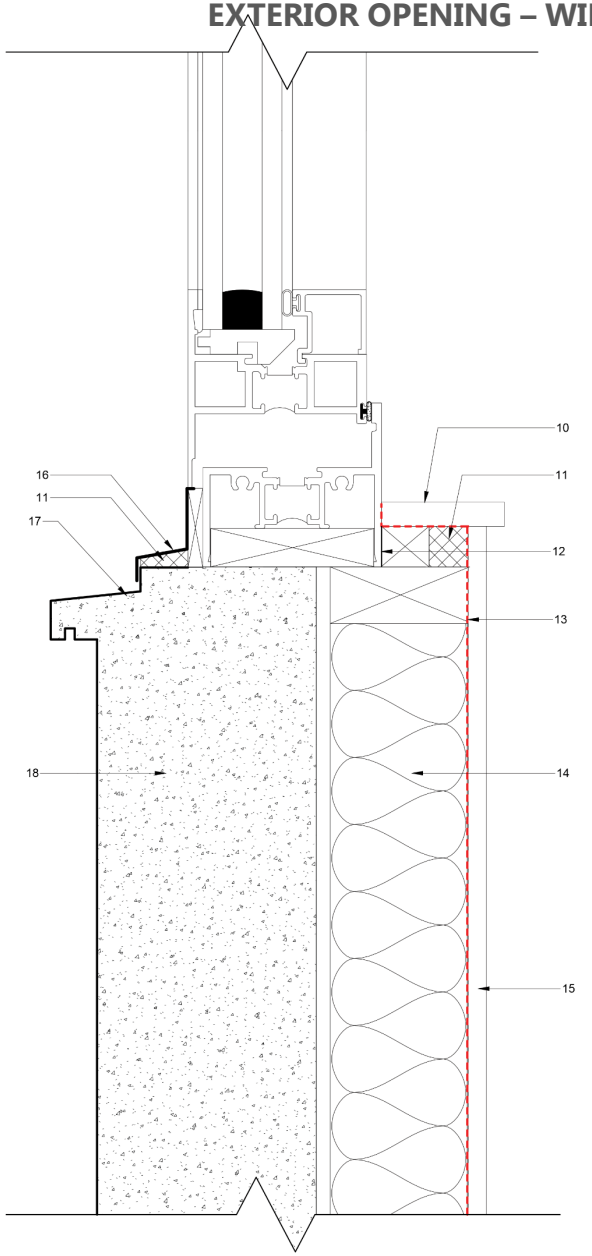


2 OUTSWING CASEMENT WINDOW - HEAD
12" = 1'-0"



3 OUTSWING CASEMENT WINDOW - JAMB
12" = 1'-0"

1. STEEL REINFORCING
2. THERMAL BREAK
3. WARM EDGE SPACER BAR
4. THERMAL INSULATION CHAMBER PROFIILE
5. ALUMINUM FRAME
6. 1/2" GAP FILLED WITH ARGON GAS
7. DOUBLE GLAZING CONSISTS OF 2 PANES OF 0.09" GLASS
8. SPACER BAR
9. LINTEL
10. SILL BOARD
11. RIGID INSULATION UNDER CILL BOARD
12. SEALANT TO BACK OF FRAME
13. VAPOR BARRIER
14. INSULATION LAYER
15. 1/2" PLASTERBOARD
16. FLASHING OVER SILL WITH COMPRESSIBLE FILLER BETWEEN WINDOW AND STUDWORK
17. WATERPROOFING COAT
18. CONCRETE WALL PANEL



4 OUTSWING CASEMENT WINDOW - SILL
12" = 1'-0"

WINDOW: **KAWNEER 8225TL THERMAL - OUTSWING CASEMENT WINDOW**

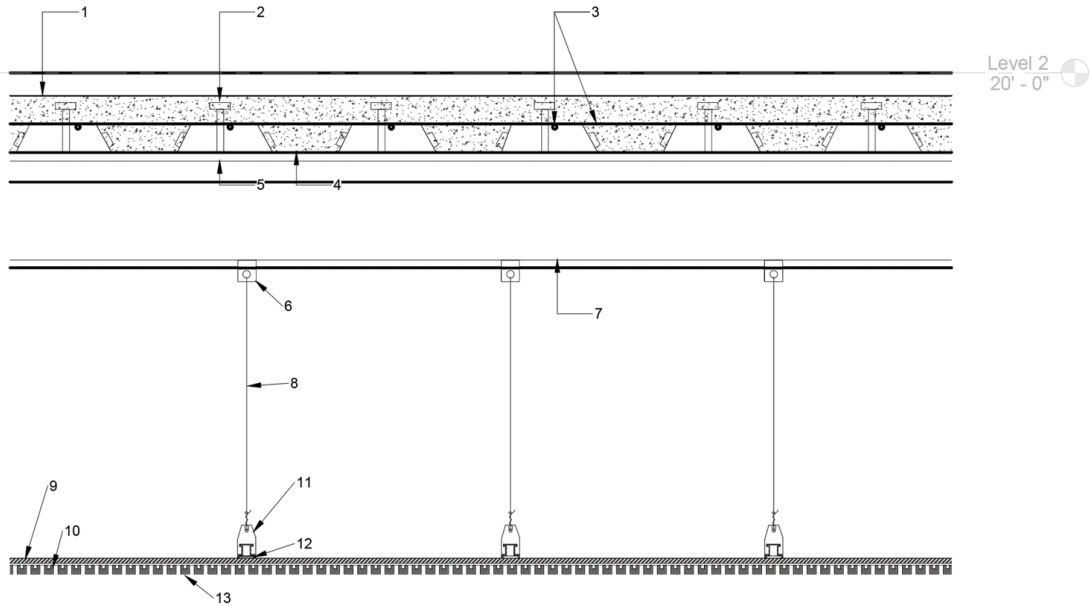
- Tested for performance class and grade of HC90 and AW90
- 2-1/4″ (57.2mm) frame depth and 0.090″ (2.3mm) nominal wall thickness
- Overlap vent design
- IsoLock™ thermal break mechanically and adhesively bonds the thermal break material to the aluminum frame and prevents dry shrinkage
- Optional factory glazing
- Large and small missile impact tested for fixed and project out configurations

DOOR: **KAWNEER 350 Medium Stile Entrance STANDARD ENTRANCES**

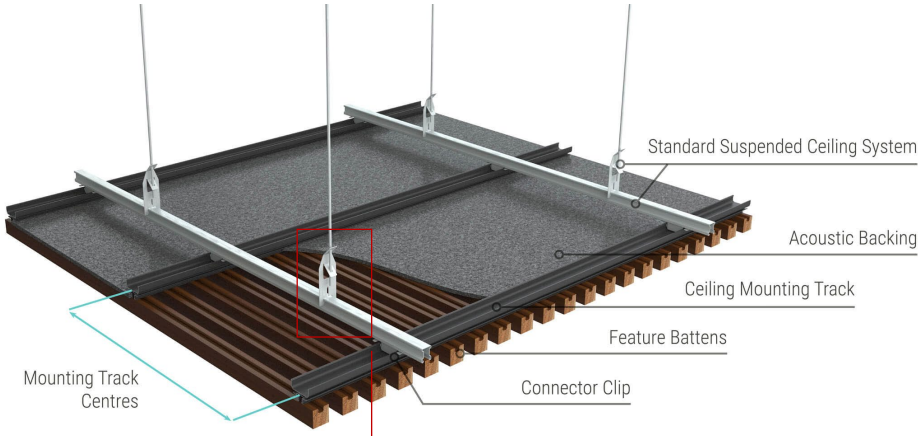
- 2-1/8″ (54mm), 3-1/2″ (87.9mm) or 5″ (127mm) sightline
- 1-3/4″ (44.5mm) depth
- Moderate- to high-traffic application
- Provides extra strength for applications
- Vertical stiles and top rails measure 3-1/2″ (88.9mm)
- Bottom rail measures 6-1/2″ (165.1mm) for extra durability

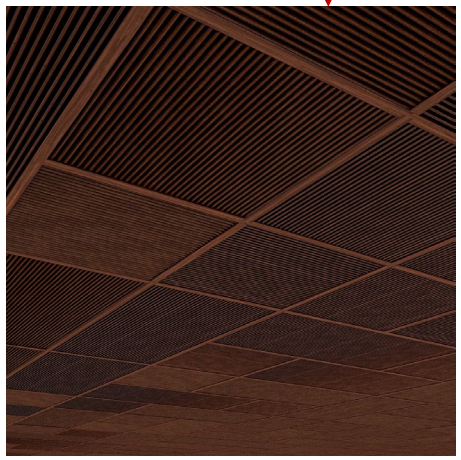
FLOOR AND CEILING SYSTEM DETAIL A129

1 6" CONCRETE SLAB, SEE FINISHING IN CALL OUT 1 - A130
2 HEADED STUDS
3 #4 BARS @ 12" O.C.
4 2" METAL DECKING
5 TOP FLANGE OF COMPOSITE BEAM
6 METAL LOAD TRANSFER BRACKET
7 W18 X 40 COMPOSITE STEEL BEAM
8 HANGER WIRE
9 ALUMINUM CEILING MOUNTING TRACK
10 ACOUSTIC BACKING
11 ALUMINUM STANDARD SUSPENDED CEILING SYSTEM
12 CONNECTOR CLIP
13 WOOD FEATURE BATTENS

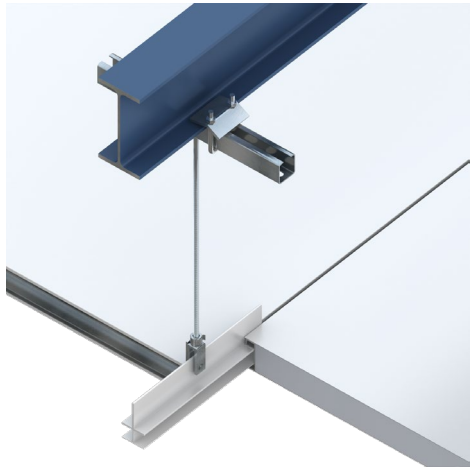


BUILDING SECTION CALLOUT 3 - FLOOR AND CEILING
2 1" = 1'-0"



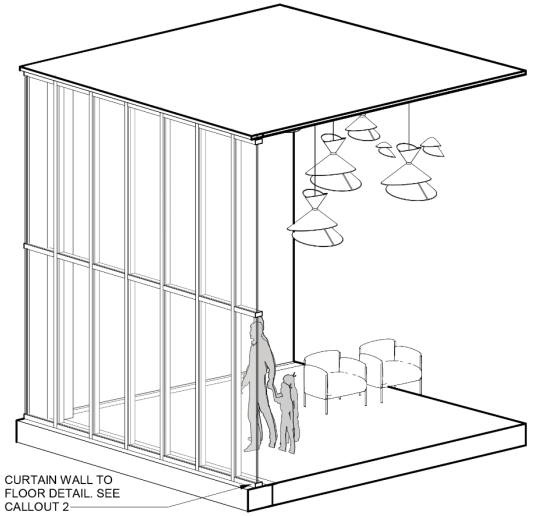


WOOD FINISH ACOUSTIC CEILING TILES

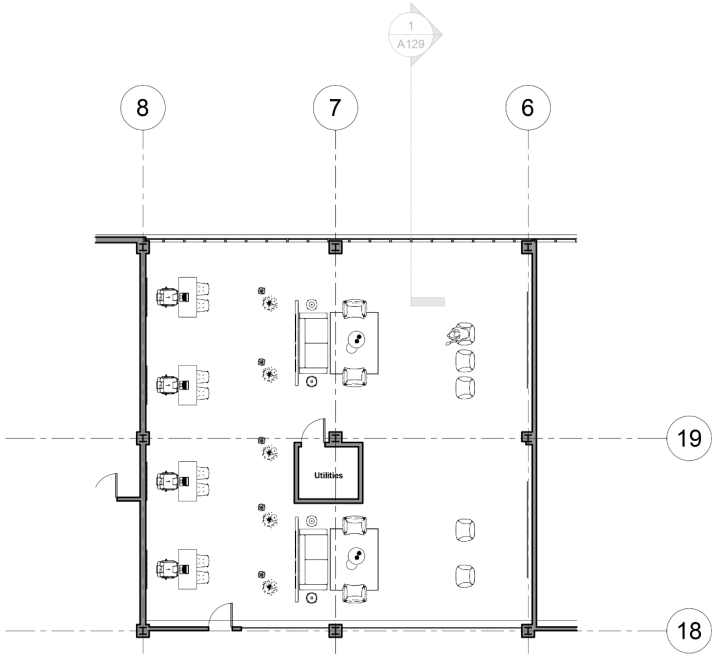


METAL SUSPENSION SYSTEM

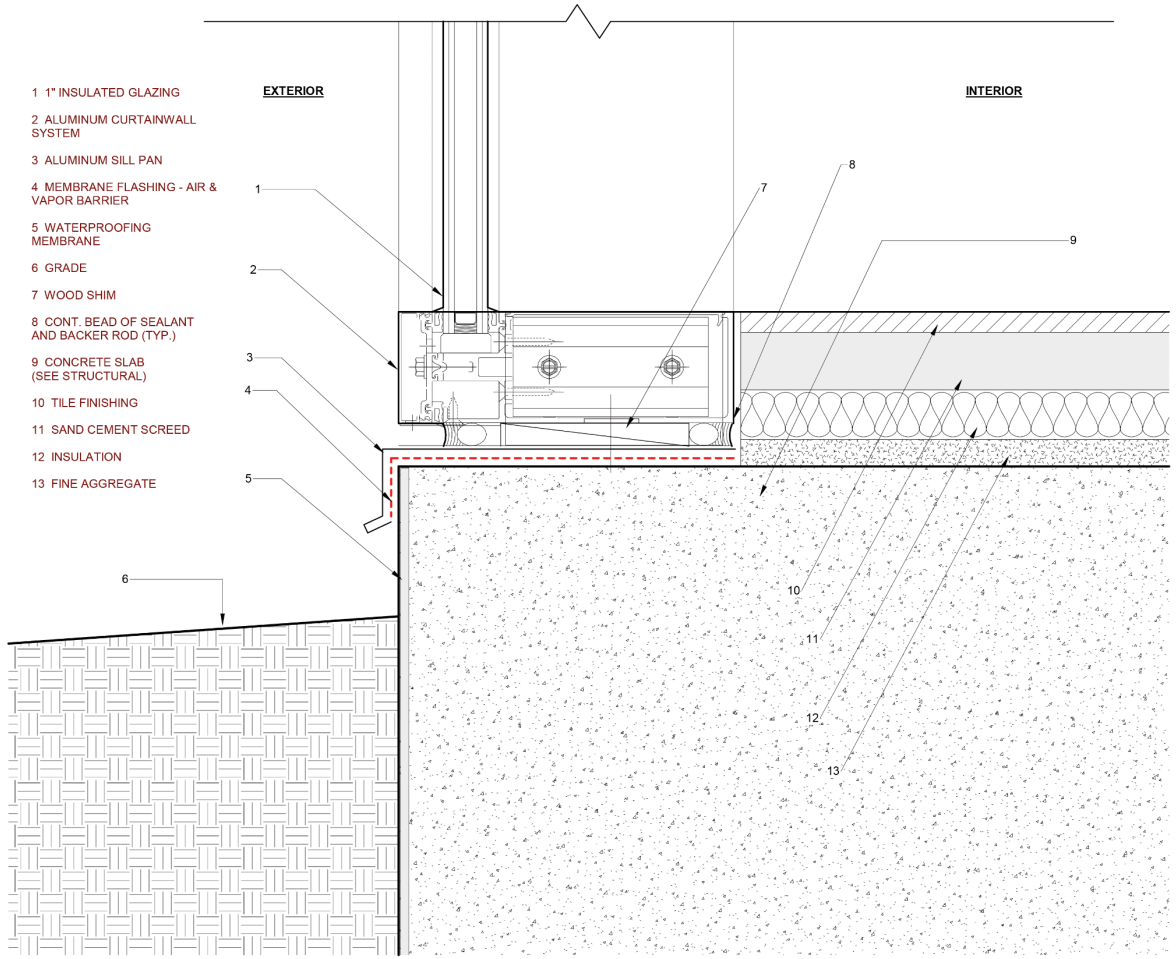
BUILDING CORNER – CURTAIN WALL TO FLOOR A130



1 BUILDING CORNER ISOMETRIC VIEW

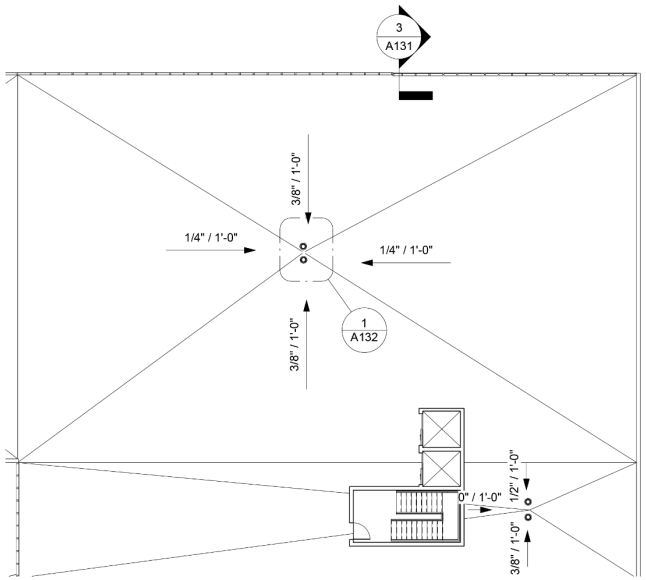


2 BUILDING CORNER KEY PLAN - LEVEL 1
3/32" = 1'-0"



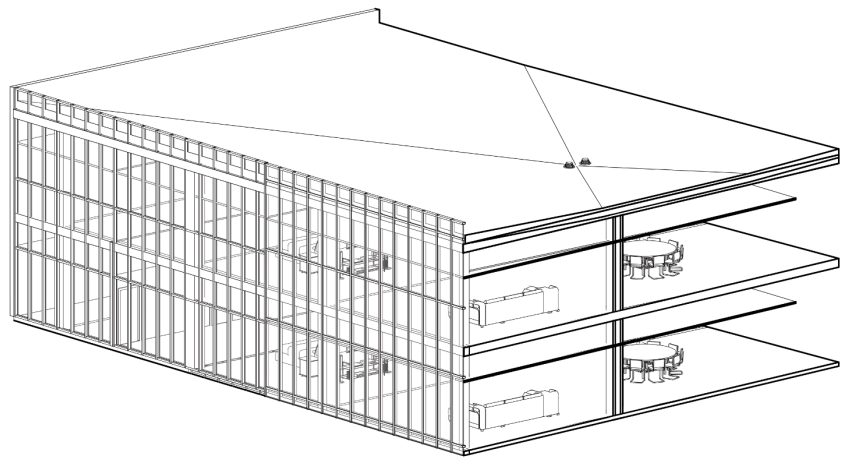
3 BUILDING SECTION CALLOUT 2 - CURTAIN WALL TO FLOOR BUILDING CORNER
6" = 1'-0"

BUILDING CORNER – CURTAIN WALL TO ROOF A131

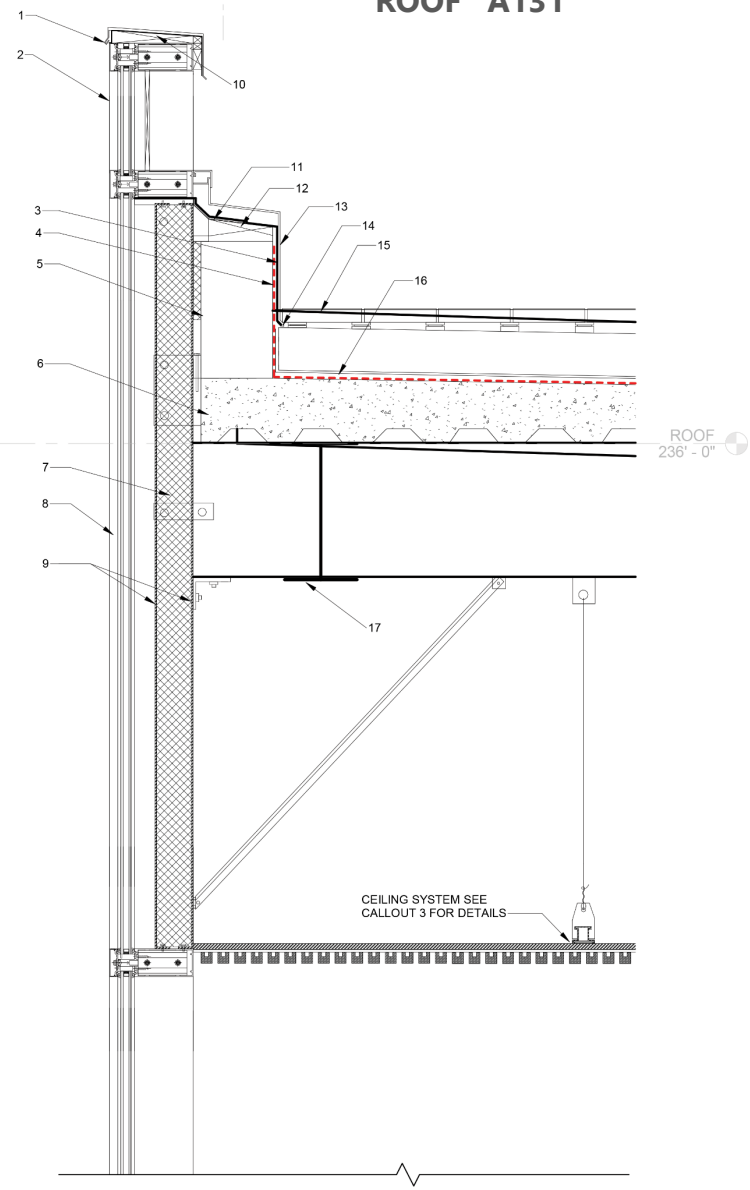


1 ROOF JUNCTURE KEY PLAN
1/16" = 1'-0"

1 ALUMINUM PARAPET CAP
2 DOUBLE-GLAZED HANDRILL ASSEMBLY
3 MEMBRANE FLASHING
4 WATERPROOF MEMBRANE
5 STEEL STUD - SLAB INTERSECTION
6 CONCRETE SLAB SEE CALLOUT 3 FOR DETAILS
7 3 1/2" WOOL INSULATION
8 FRONT GLASS - SPANDREL PANEL
9 METAL BACKPAN
10 SLOPED CONTINUOUS BLOCKING
11 SHEET METAL SUPPORT
12 SLOPED BLOCKING
13 METAL COUTERFLASHING
14 COUNTERFLASHING CLEAT
15 PROTECTED MEMBRANE ROOF ASSEMBLY
16 METAL ROOF DECKING
17 STEEL BEAM SEE CALLOUT 3 FOR DETAILS

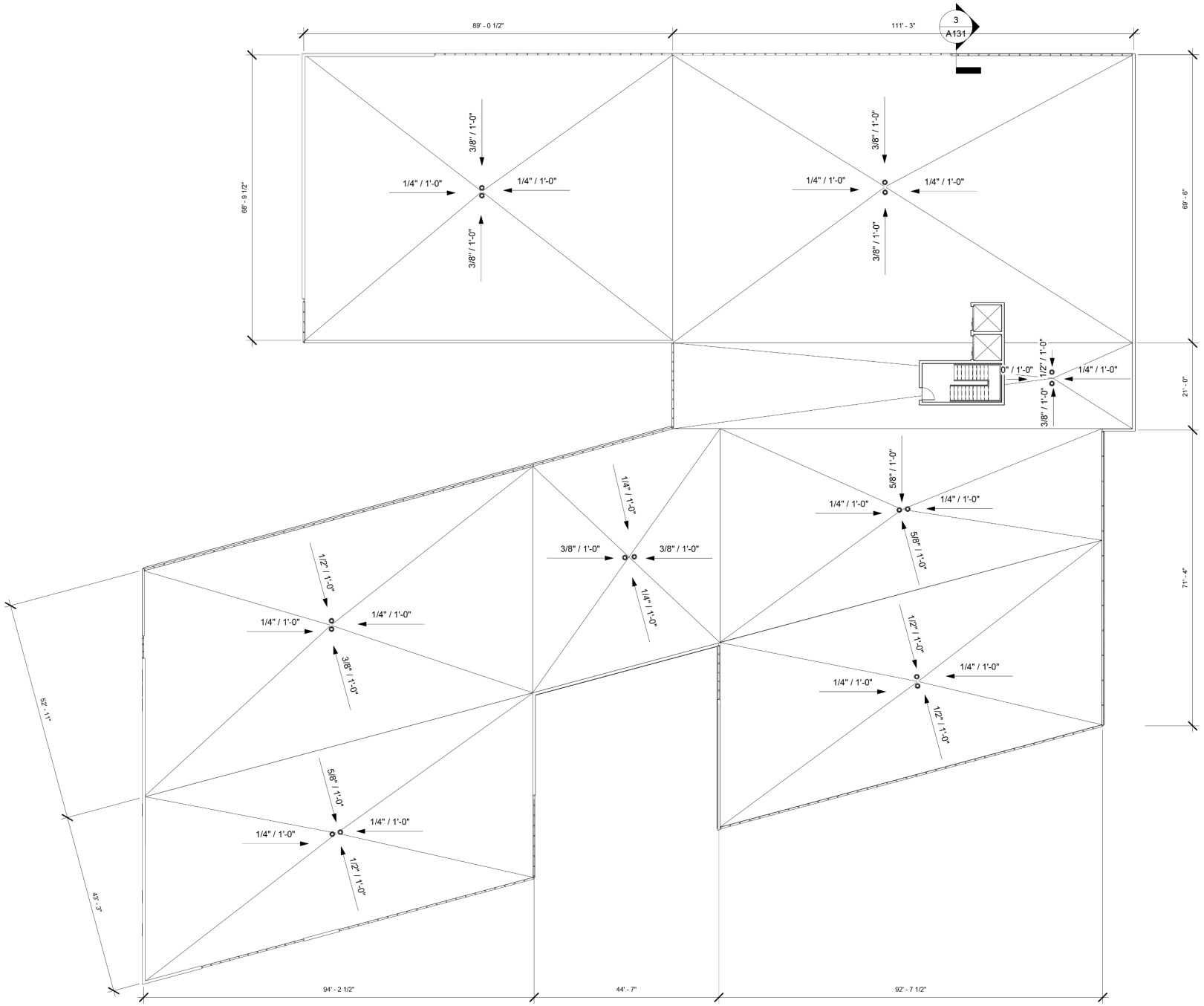


2 ROOF JUNCTURE ISOMETRIC VIEW
Copy 1



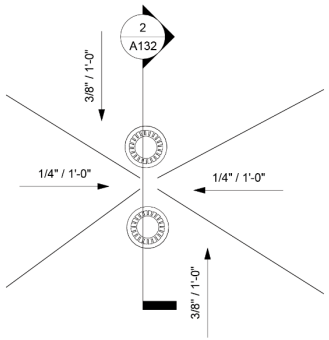
3 ROOF DETAIL
1 1/2" = 1'-0"

ROOF PLAN – DRAINAGE A132

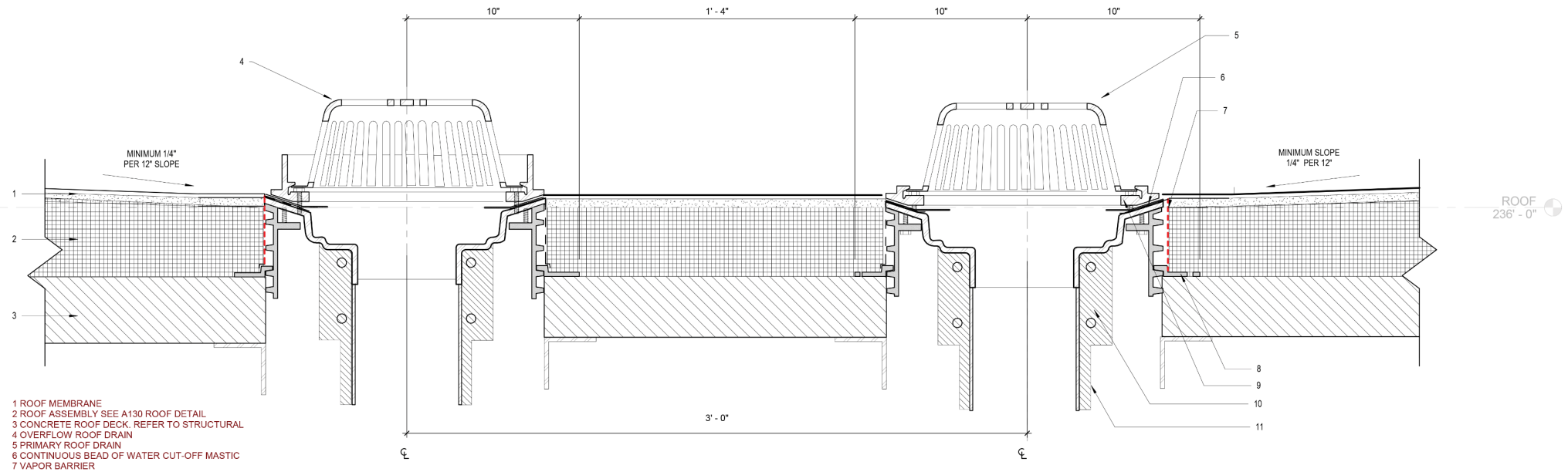


2 ROOF
1/16" = 1'-0"

ROOF ELEMENT – DRAINAGE A133



1 ROOF JUNCTOR KEY PLAN - Callout 1
3/8" = 1'-0"



1 ROOF MEMBRANE
2 ROOF ASSEMBLY SEE A130 ROOF DETAIL
3 CONCRETE ROOF DECK. REFER TO STRUCTURAL
4 OVERFLOW ROOF DRAIN
5 PRIMARY ROOF DRAIN
6 CONTINUOUS BEAD OF WATER CUT-OFF MASTIC
7 VAPOR BARRIER
8 CONTINUOUS BEAD OF WATER CUT-OFF MASTIC
9 TOP MOUNT DECK PLATE. SECURE TO ROOF DECK WITH STAINLESS STEEL HARDWARE
10 DRAIN LEADER
11 DRAIN LEADER INSULATION

2 ROOF DRAINAGE DETAIL
3" = 1'-0"

ELECTRICAL SYSTEM

DESIGN DEVELOPMENT | JINGYING ZHENG | SUMMER 2025

BUILDING SUMMARY

Total Area: 1,312,500 sq ft

Floors: 20 total
• 1st Floor: Commercial, retail, office, library
• Floors 2–20: Residential (19 floors)

Residential Layout: 4 units per floor × 2,800 sq ft = 11,200 sq ft/floor

Total Building Capacity: 7,500A

TRANSFORMER

- 3 X 2000kVA
- T1: 1st floor commercial/retail, all AHUs, elevators, fire pump
- T2: Floors 2 -7 residential
- T3: Floors 8 – 19 residential

GENERATOR

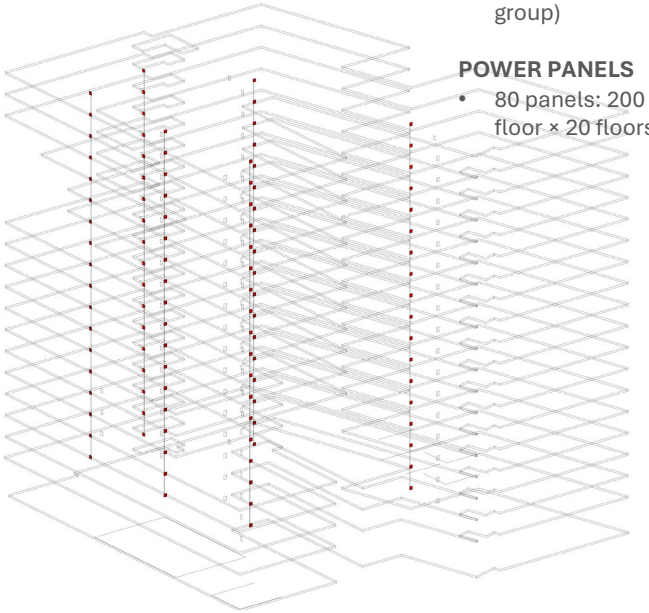
- Diesel, 3-phase, 2,500 kW standby, 1,500 RPM, closed-loop cooled, DSP AVR

MAIN PANELS (MDP)

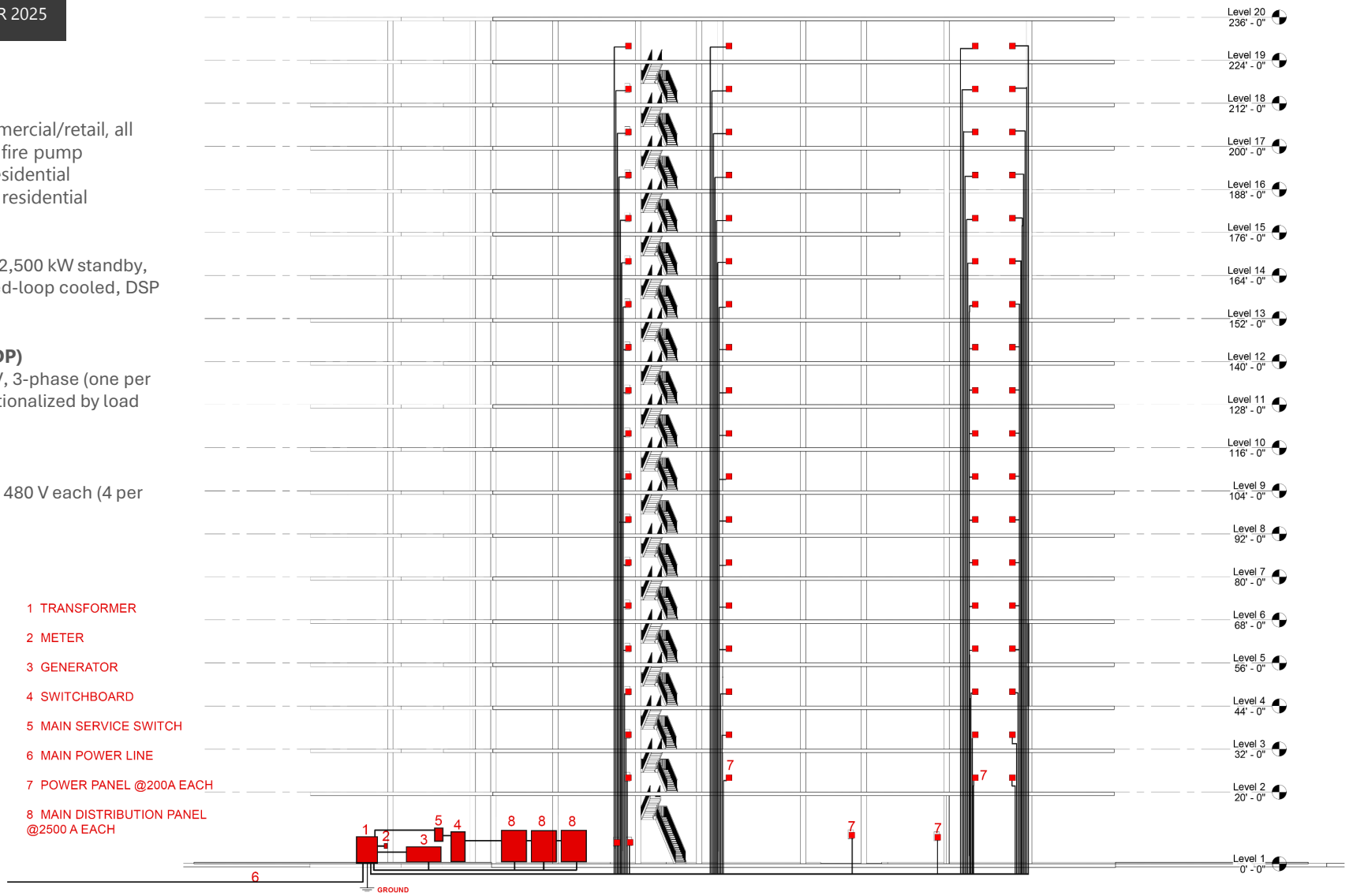
- 3 × 2,500 A, 480 V, 3-phase (one per transformer, sectionalized by load group)

POWER PANELS

- 80 panels: 200 A, 480 V each (4 per floor × 20 floors)



ELECTRICAL PANELS SYSTEM - AXONOMETRIC


1 TRANSFORMER
2 METER
3 GENERATOR
4 SWITCHBOARD
5 MAIN SERVICE SWITCH
6 MAIN POWER LINE
7 POWER PANEL @200A EACH
8 MAIN DISTRIBUTION PANEL @2500 A EACH
Level 20 236' - 0"
Level 19 224' - 0"
Level 18 212' - 0"
Level 17 200' - 0"
Level 16 188' - 0"
Level 15 176' - 0"
Level 14 164' - 0"
Level 13 152' - 0"
Level 12 140' - 0"
Level 11 128' - 0"
Level 10 116' - 0"
Level 9 104' - 0"
Level 8 92' - 0"
Level 7 80' - 0"
Level 6 68' - 0"
Level 5 56' - 0"
Level 4 44' - 0"
Level 3 32' - 0"
Level 2 20' - 0"
Level 1 0' - 0"
GROUND

NOTE: TRANSFORMER AND METER ARE LOCATED ON THE EXTERIOR OF THE BUILDING, CONNECTED TO MAIN POWER LINE UNDER S PARKER ST

1/16" = 1'-0"

LIGHT FIXTURE DETAILS - DIMENSION

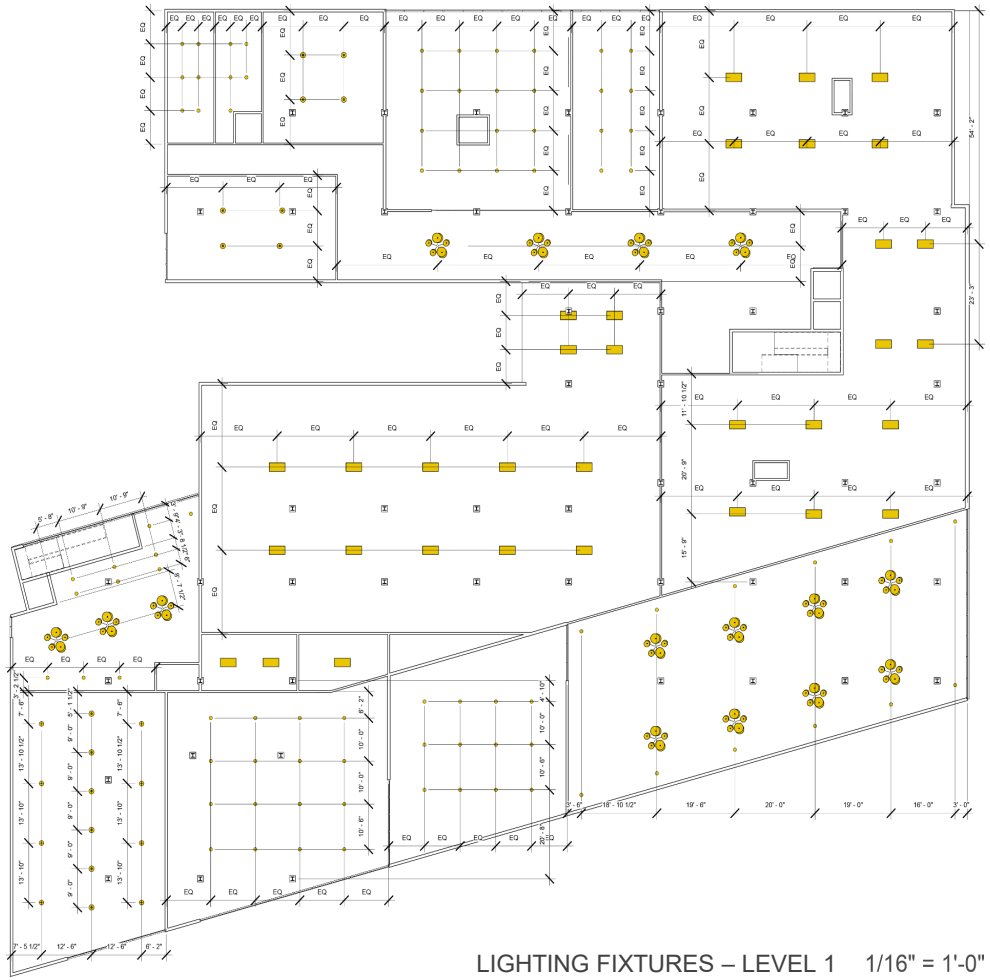
LED LINEAR CEILING LIGHT BOX

@ 2' X 4' 120V (IN RESIDENTIAL UNITS & MECHANIC ROOM)

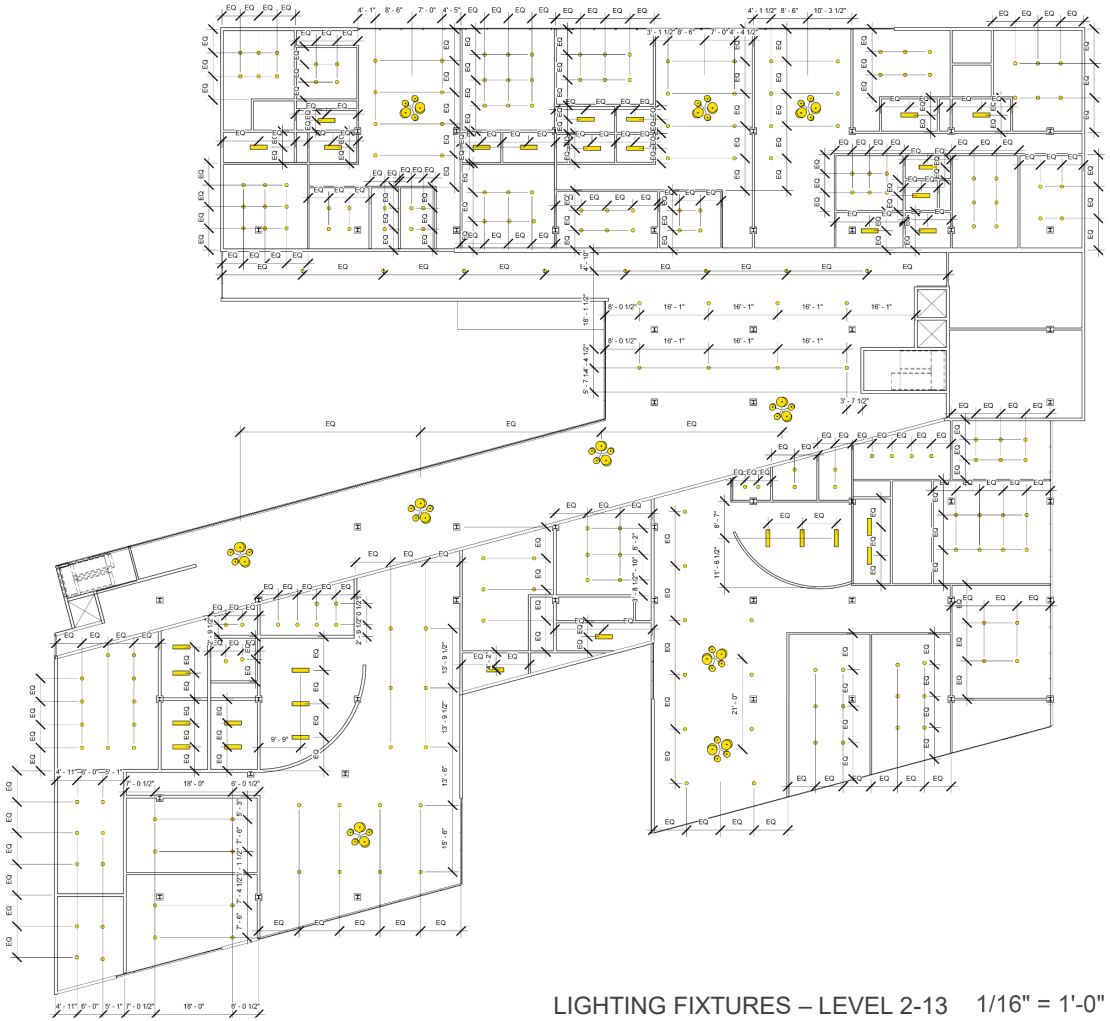
@ 2' X 4' 277V (IN PARKING FACILITY)

LED CIRCULAR RECESSED DOWNLIGHT @ 6" 100V

LUSTRE 3 KIMONO DECO CHANDELIER @ 220 - 240V



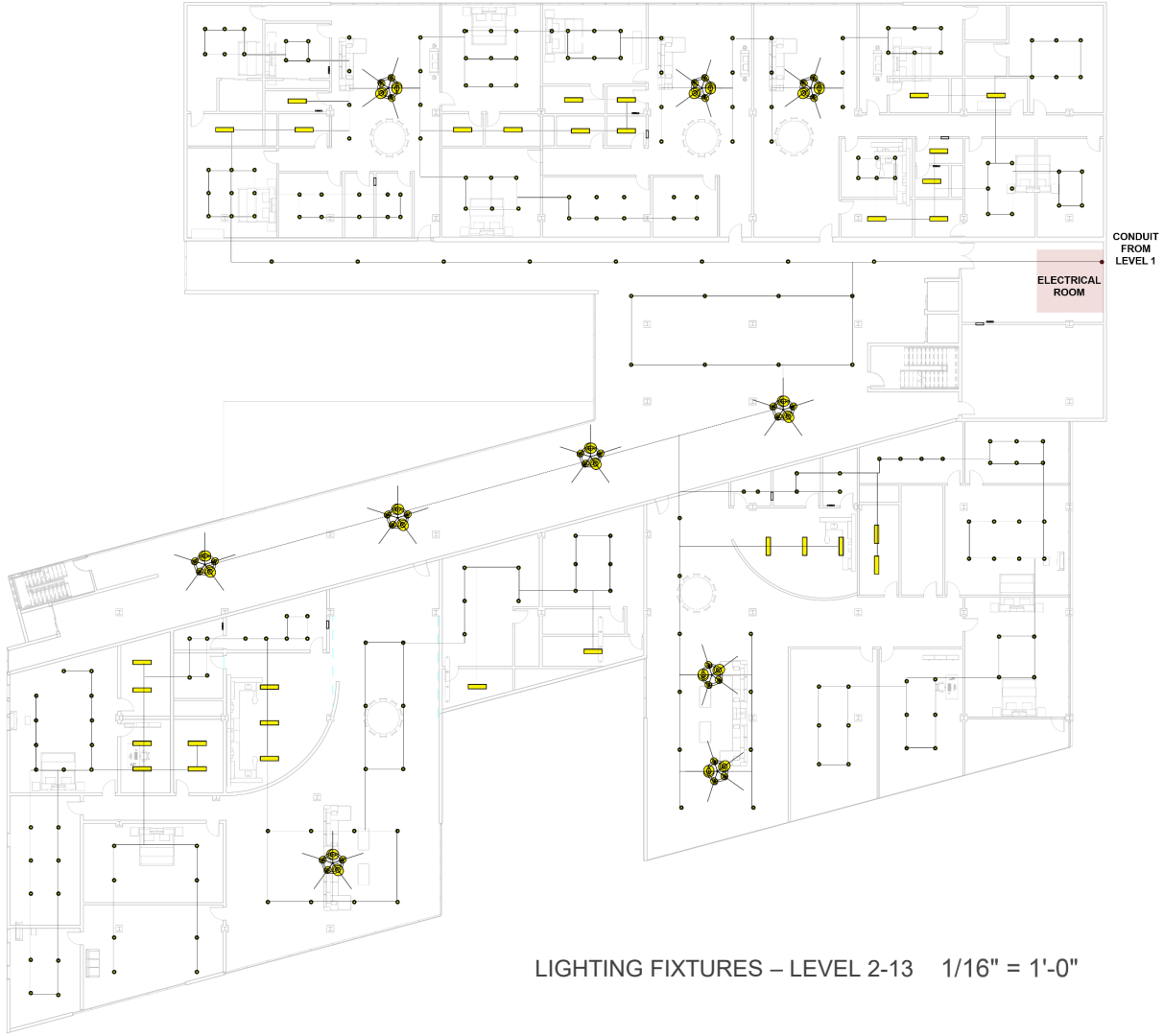
LIGHTING FIXTURES – LEVEL 1 1/16" = 1'-0"



LIGHTING FIXTURES – LEVEL 2-13 1/16" = 1'-0"

LIGHT FIXTURE DETAILS – ELECTRICAL CIRCUIT

LIGHTING FIXTURES – LEVEL 1 1/16" = 1'-0"



LIGHTING FIXTURES – LEVEL 2-13 1/16" = 1'-0"

MECHANICAL SYSTEM - HVAC

DESIGN DEVELOPMENT | JINGYING ZHENG | SUMMER 2025

1

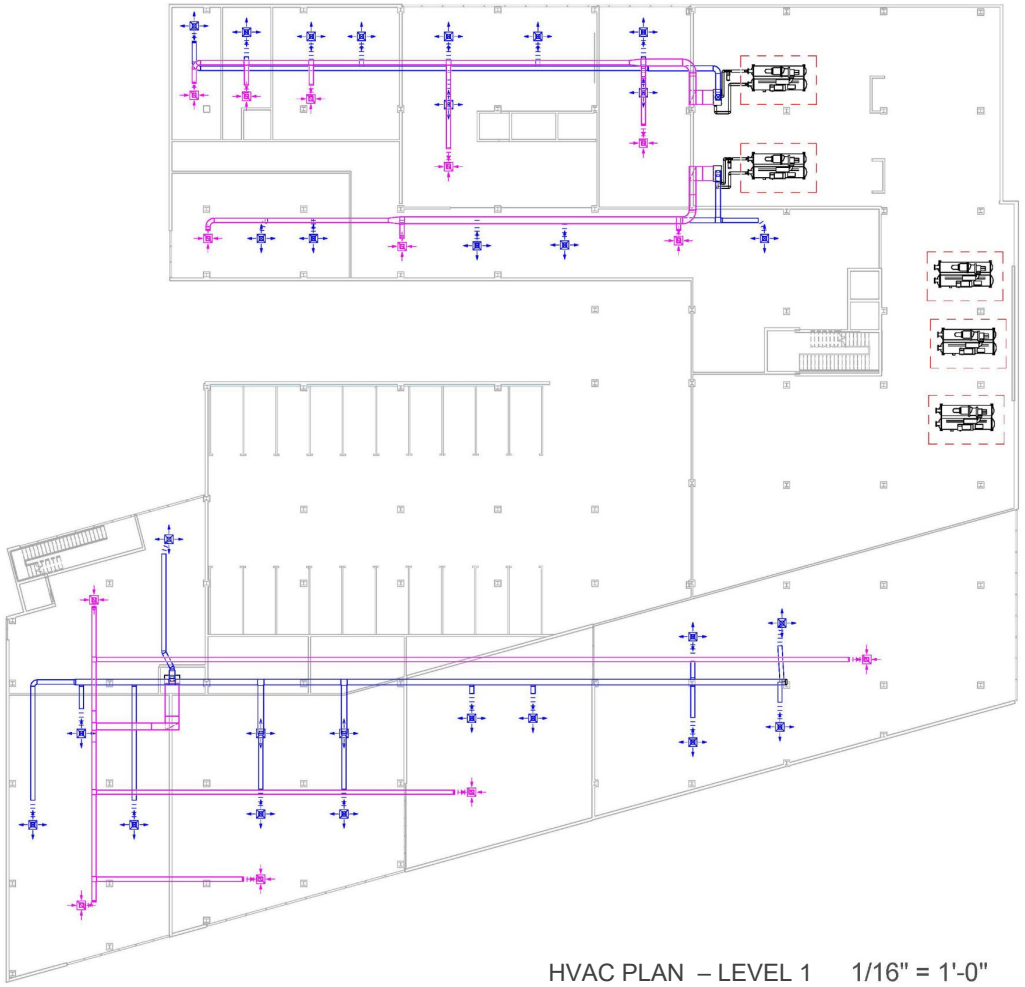
2

3

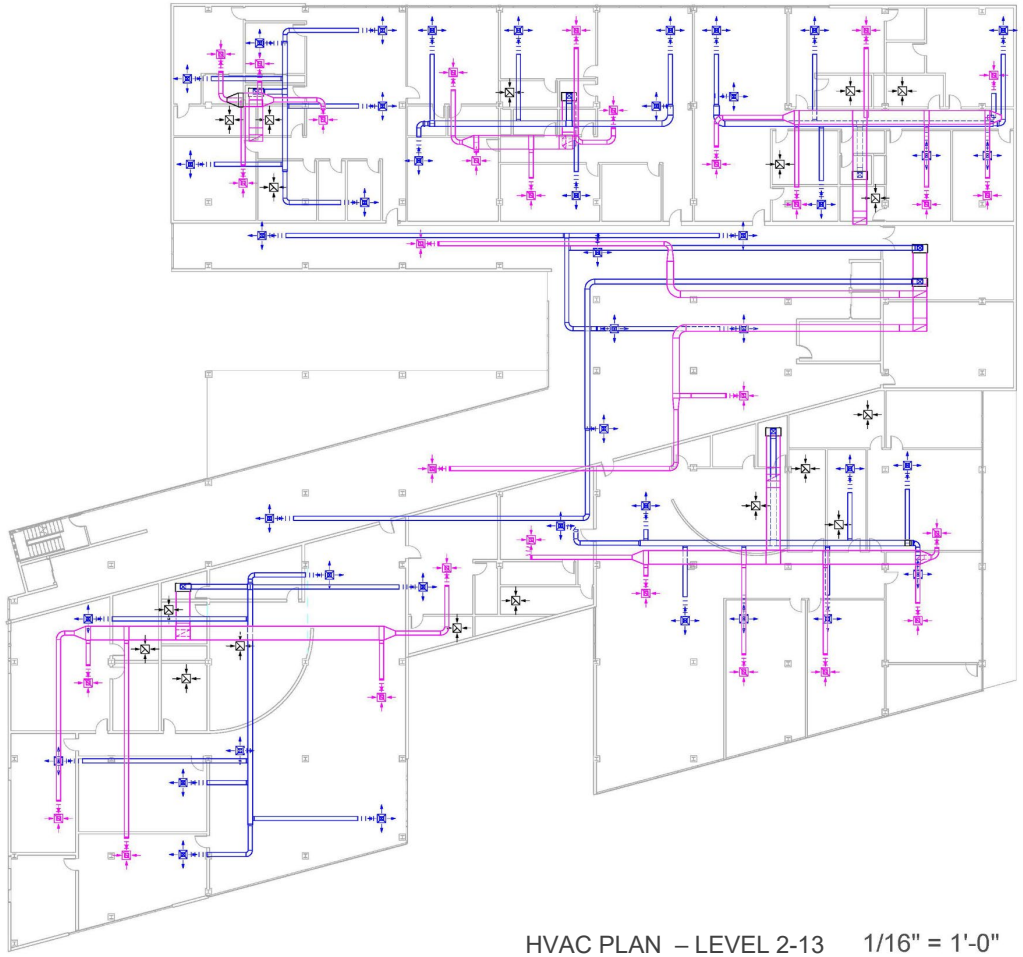
1: Flex Duct @ 9” Diameter

2: Supply Diffuser - Grid Dropped Ceiling
24” X 24” Face | 12” X 12” Connections

3: Return Diffuser - Grid Dropped Ceiling
24” X 24” Face | 12” X 12” Connections



HVAC PLAN – LEVEL 1 1/16" = 1'-0"



HVAC PLAN – LEVEL 2-13 1/16" = 1'-0"

BUILDING SPECIFICATION

Total area
1,312,500 SQ FT

Cooling required:
~244 tons of cooling

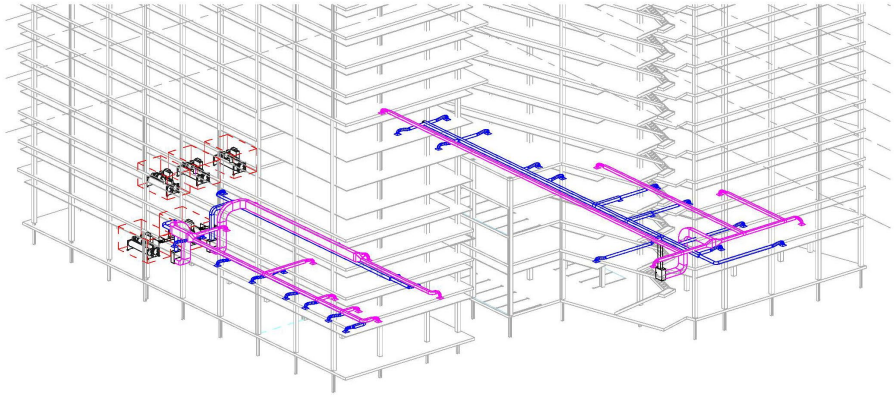
System:
Water-cooled system

Duct size:
Supply: 30” x 12”
return: 30” x 12”
branch: 9” round
(both supply / return)

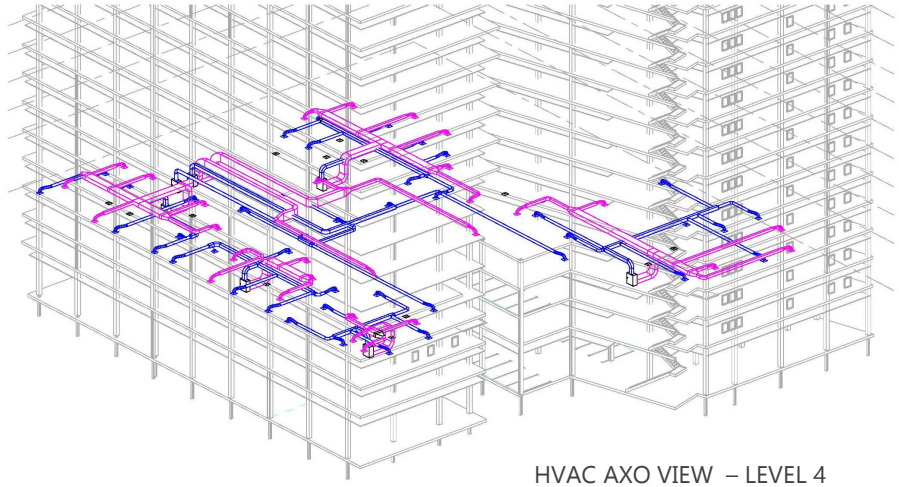
Pipe size:
1” diameter

LEGEND

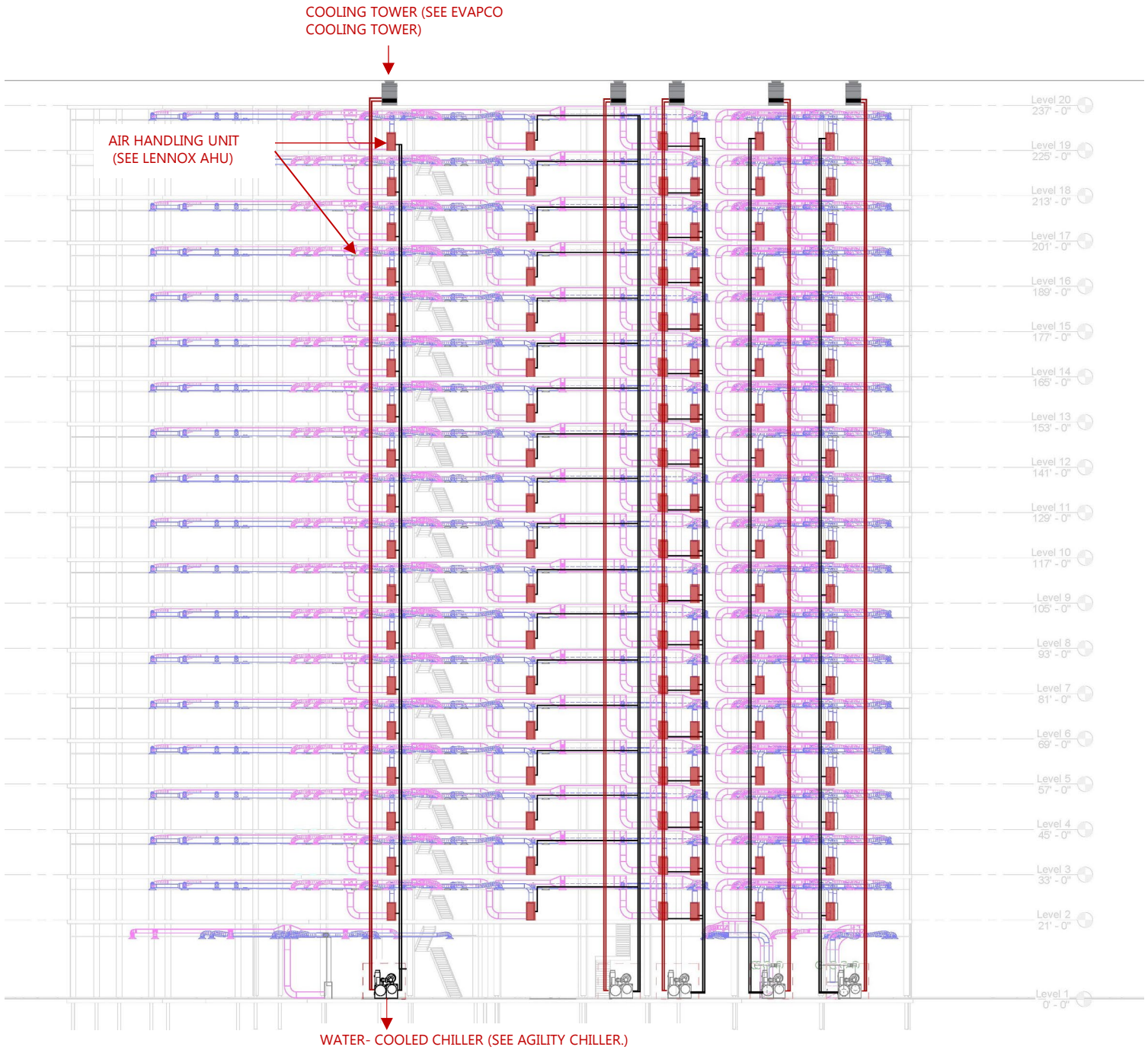
- RETURN GRILL
- SUPPLY GRILL
- SUPPLY FEED
- RETURN FEED
- EXHAUST GRILL
- WATER-COOLED CHILLER



HVAC AXO VIEW – LEVEL 1

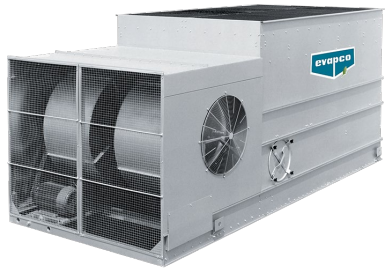


HVAC AXO VIEW – LEVEL 4
(SAME FOR LEVEL 2 - 20)


COOLING TOWER (SEE EVAPCO COOLING TOWER)
AIR HANDLING UNIT (SEE LENNOX AHU)
WATER- COOLED CHILLER (SEE AGILITY CHILLER.)
Level 20 237' - 0"
Level 19 225' - 0"
Level 18 213' - 0"
Level 17 201' - 0"
Level 16 189' - 0"
Level 15 177' - 0"
Level 14 165' - 0"
Level 13 153' - 0"
Level 12 141' - 0"
Level 11 129' - 0"
Level 10 117' - 0"
Level 9 105' - 0"
Level 8 93' - 0"
Level 7 81' - 0"
Level 6 69' - 0"
Level 5 57' - 0"
Level 4 45' - 0"
Level 3 33' - 0"
Level 2 21' - 0"
Level 1 0' - 0"

Lennox CBA38MV small split air handler

- Low-profile configuration for rooftop installation
- Stainless steel basin and heavy-galvanized casing options
- Factory-assembled for ease of installation
- High-efficiency heat transfer coil with heavy-duty construction
- Meets CTI STD-201 and ASHRAE 90.1 energy efficiency requirements
- Integral drift eliminators with <0.001% drift rate
- Ultra-quiet fan options available for noise-sensitive applications
- Designed for low maintenance and long operating life



EVAPCO LPT Series Cooling Tower

- Induced-draft, counterflow, low-profile
- Capacity Range: 100–300 tons per unit
- Low height (under 10 ft for most units)
- Certified by IBC
- Aluminized steel cabinet with insulated, sweat-resistant lining
- Non-corroding composite drain pan with anti-microbial treatment
- Designed to exceed ahri 210/240 standards for performance & efficiency

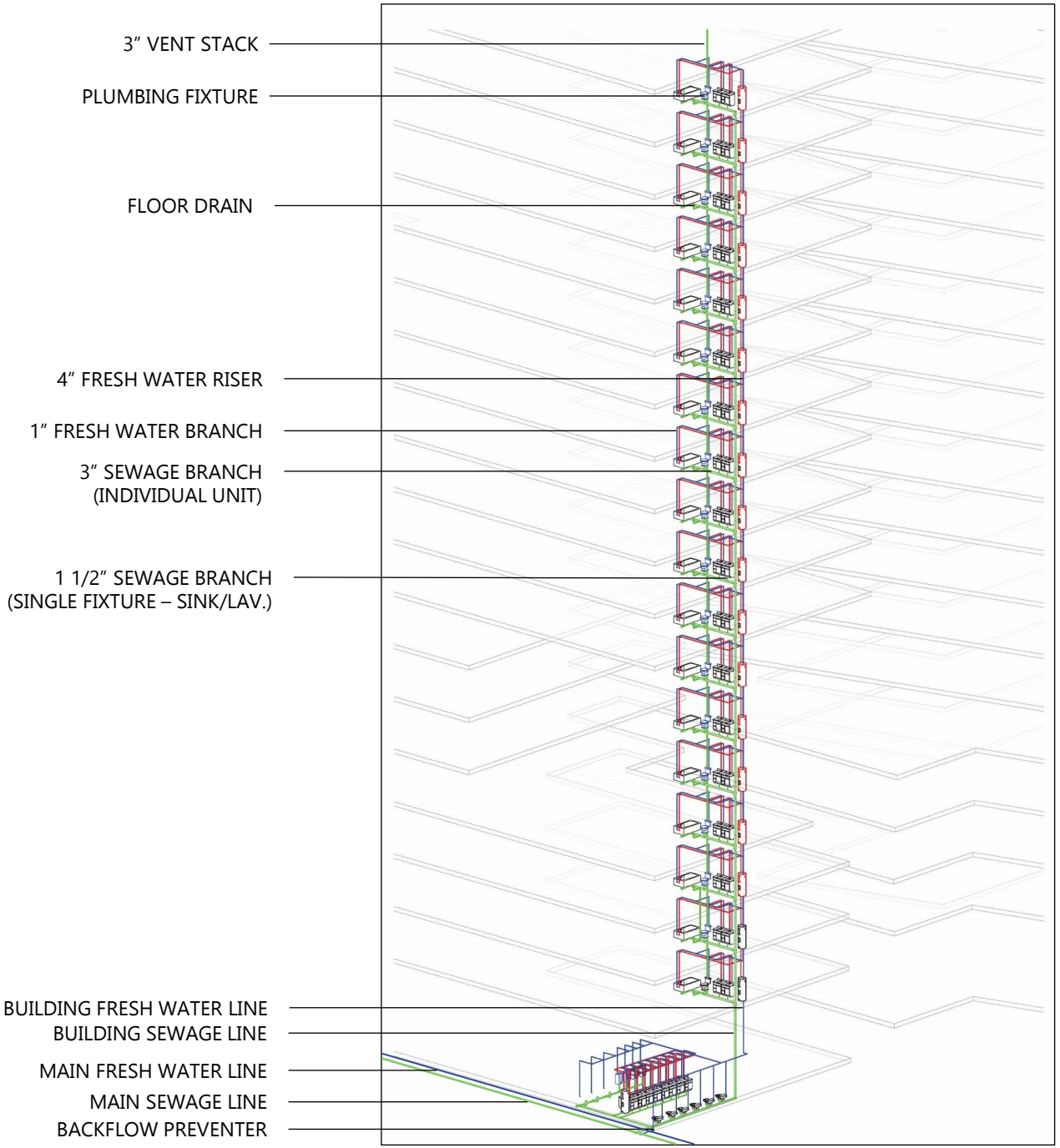
Agility Magnetic Bearing Centrifugal Chiller

- Capacity Range : 175 – 500 tons, 60Hz
- Refrigerant: R-513A (medium-pressure, low GWP)
- Compressor type: Magnetic-bearing centrifugal, permanent-magnet
- Medium Pressure
- Efficiency: IPLV exceeds ASHRAE 90.1-2022
- Performance: Rapid Restart™ – 80% capacity in <4 mins
- Trane Symbio® 800 with BAS integration
- Fits through standard doors or sectionable
- Maintenance: Oil-free, low friction, fewer service requirements
- Minimal noise, no vibration damping required

MECHANICAL SYSTEM – PLUMBING

DESIGN DEVELOPMENT | JINGYING ZHENG | SUMMER 2025

Item	Specification
Building Use	Residential Tower (R-2 Occupancy)
Total Residential Floors	17
Units per Floor	4
Total Residential Units	68
Approx. Unit Size	2,805 sq ft
Occupants per Unit	14 (based on 200 sq ft per person)
Occupants per Floor	56
Total Residential Occupants	952
Bathrooms per Unit	3
Water Closets per Unit	3
Total Water Closets (Residential)	68 units × 3 = 204 WCs
Minimum Required WCs (Code)	1 per dwelling unit = 68 WCs (per FPC/IPC R-2)
WC-to-Occupant Ratio (Actual)	1 WC per ~4.7 occupants



ANNOTATION

1 BUILDING FRESH WATER LINE
2 BUILDING SEWAGE LINE
3 4″ FRESH WATER RISER
4 1″ FRESH WATER BRANCH
5 3″ SEWER BRANCH & STACK
6 1 1/2″ SEWER BRANCH
7 FIXTURE
8 VENT STACK
9 FLOOR DRAIN
10 WET WALL
11 BACKFLOW PREVENTER
12 WATER METER

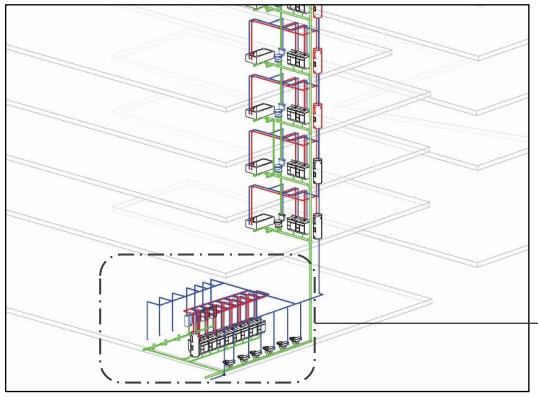
LEGENDS

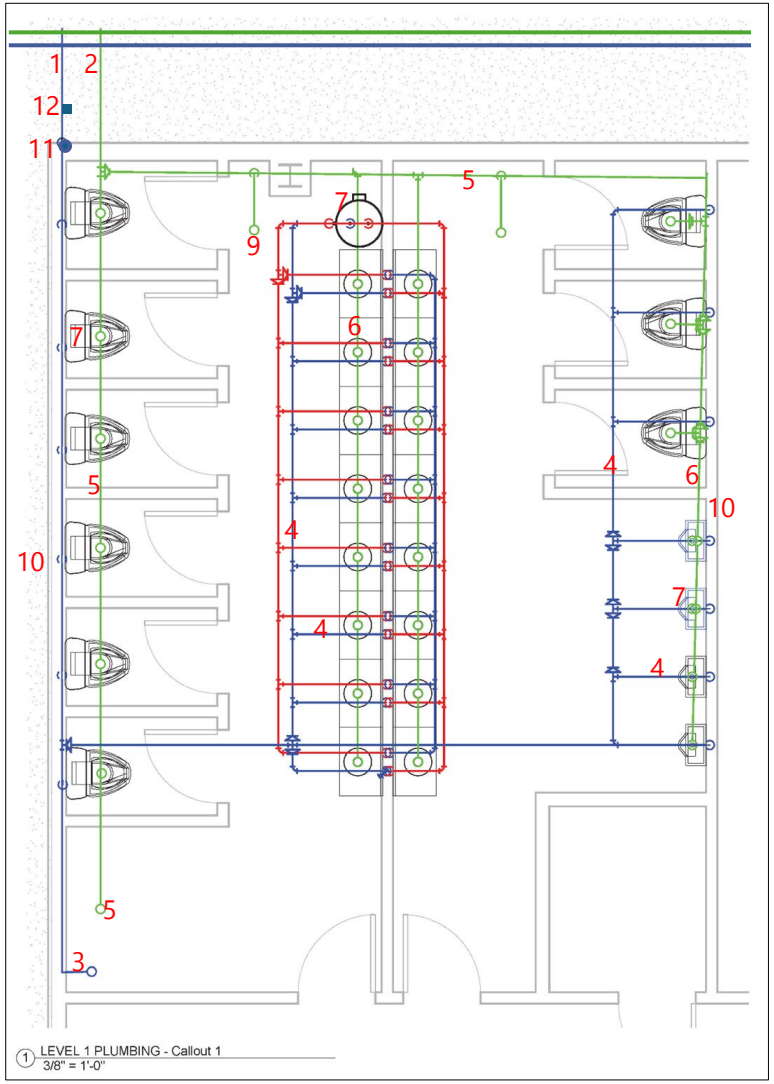
DOMESTIC COLD/FRESH WATER
DOMESTIC HOT WATER
SANITARY

W.H.
W.C. – WATER CLOSET
LAV. – LAVATORY
URI. – URINAL
F.D. – FLOOR DRAIN
V.S. – VENT STACK
B.P. – BACKFLOW PREVENTER

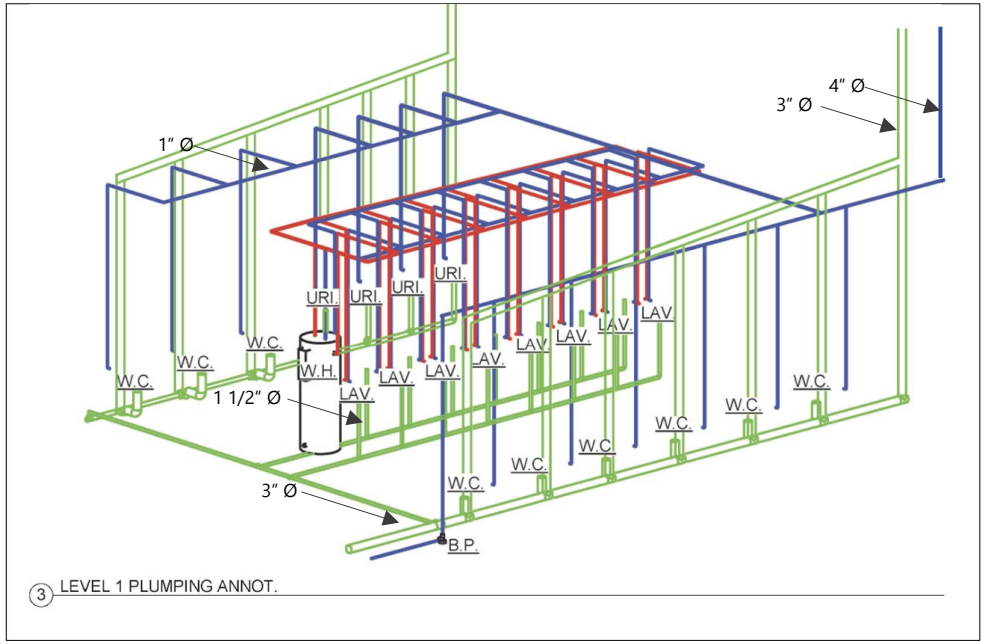
1″ Ø → PIPE DIMENSION

CALL OUT

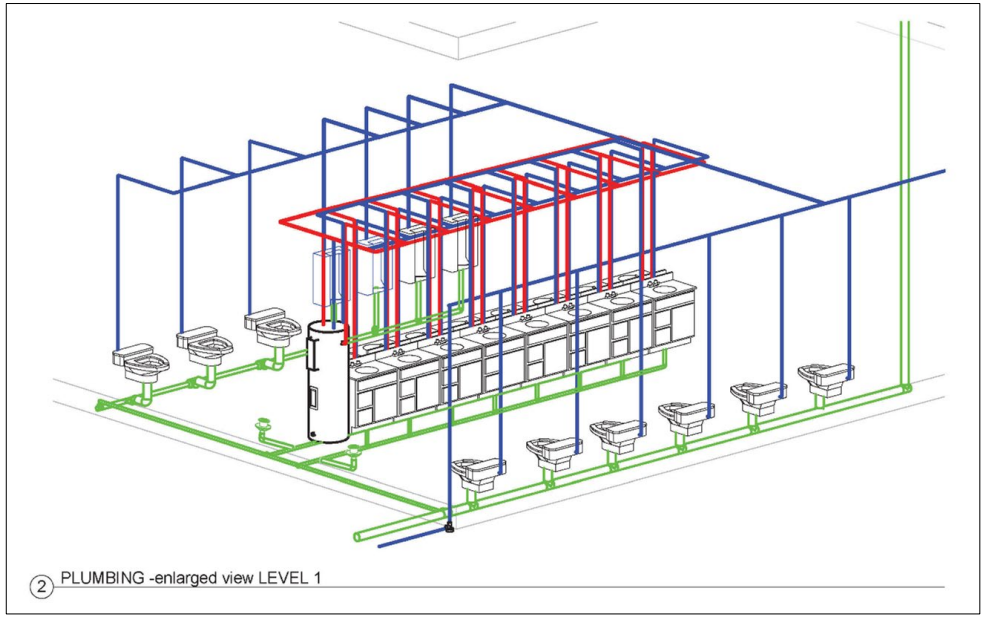




① LEVEL 1 PLUMBING - Callout 1
3/8" = 1'-0"



③ LEVEL 1 PLUMPING ANNOT.



② PLUMBING -enlarged view LEVEL 1

ANNOTATION

1 BUILDING FRESH WATER LINE
2 BUILDING SEWAGE LINE
3 4″ FRESH WATER RISER
4 1″ FRESH WATER BRANCH
5 3″ SEWER BRANCH & STACK
6 1 1/2″ SEWER BRANCH
7 FIXTURE
8 VENT STACK
9 FLOOR DRAIN
10 WET WALL
11 BACKFLOW PREVENTER
12 WATER METER

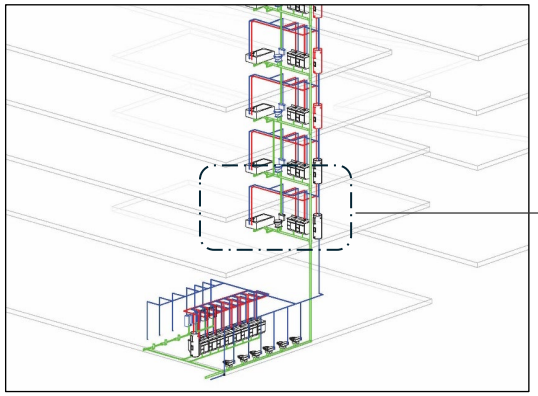
LEGENDS

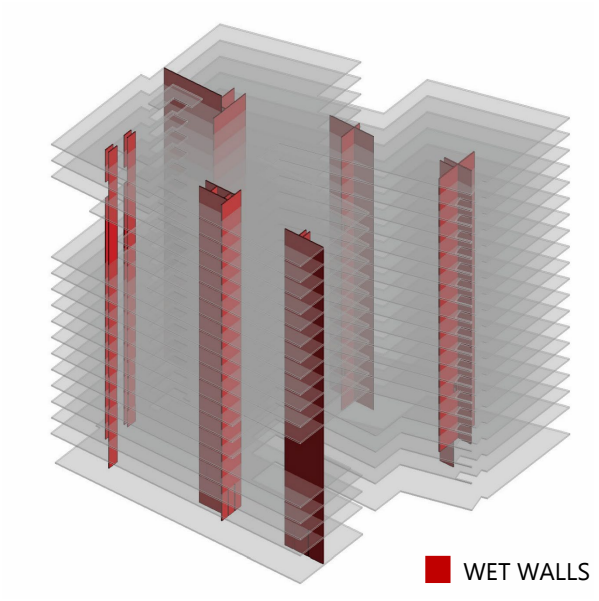
DOMESTIC COLD/FRESH WATER
DOMESTIC HOT WATER
SANITARY

W.H.
W.C. – WATER CLOSET
LAV. – LAVATORY
URI. – URINAL
F.D. – FLOOR DRAIN
V.S. – VENT STACK
B.P. – BACKFLOW PREVENTER

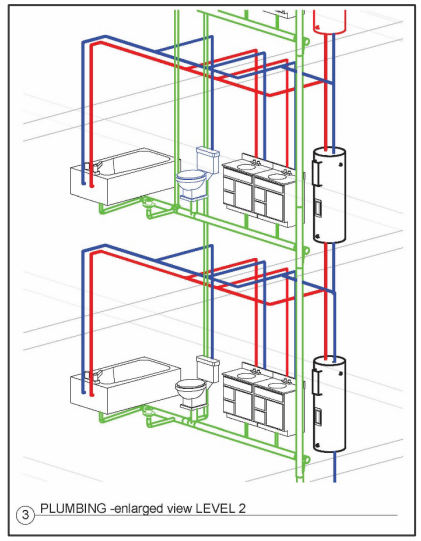
1″ Ø → PIPE DIMENSION

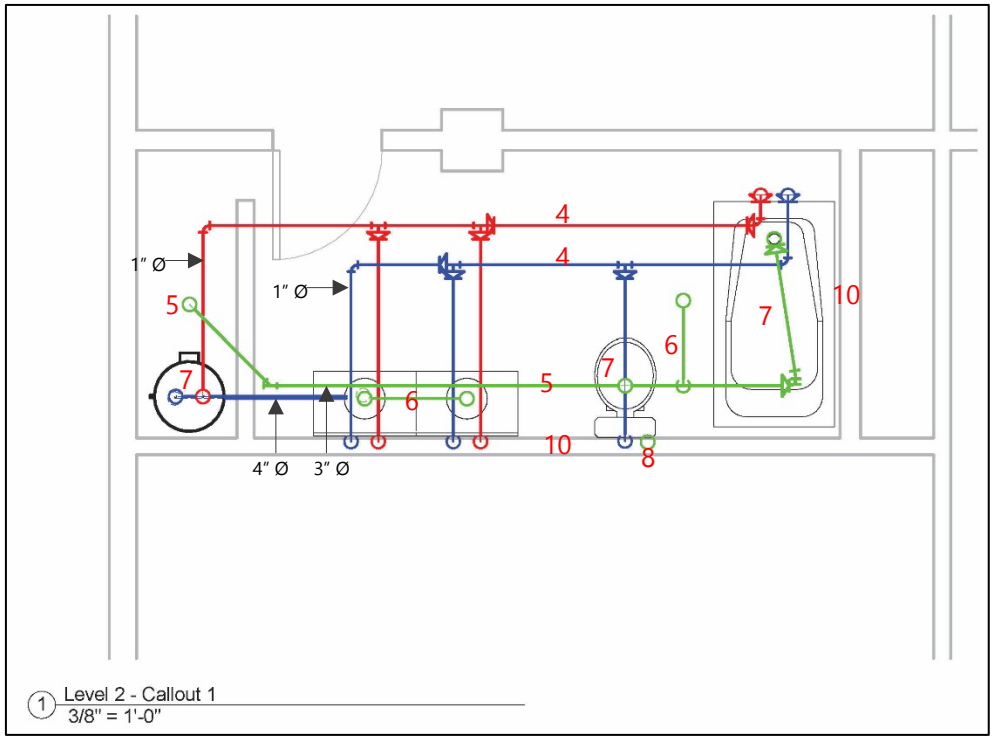
CALL OUT

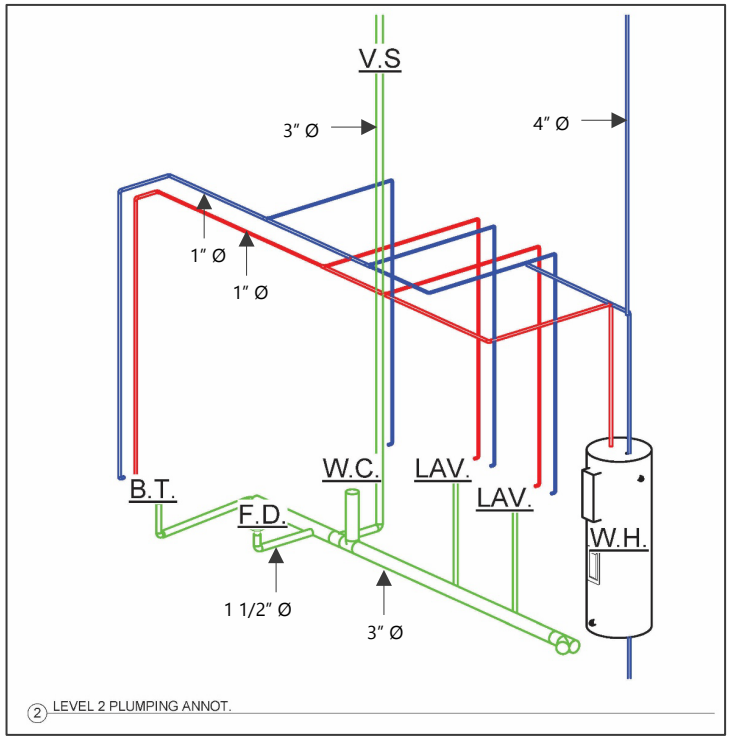




NOTE: The plumbing diagrams include two key callouts - the 1st-floor diagram represents the public bathroom layout used in the commercial portion of the building, while the 2nd-floor callout shows one of the three bathrooms in a typical residential unit. This residential bathroom is shown to illustrate the plumbing system concept only and does not represent the full unit layout. Other bathrooms in the residential units are aligned with wet walls to optimize vertical shaft efficiency.







FLOOR DRAIN: **Zurn ZN1400**

- 6" round, nickel bronze strainer, sediment bucket, trap primer connection
- Cast iron body, nickel bronze strainer
- Heavy-duty commercial floor drain with removable bucket and trap primer port

WATER CLOSET: **American Standard Afwall® 2257.101**

- Wall-hung, ADA-compliant, 1.28 GPF, siphon jet flushometer bowl, elongated
- Material: Vitreous china with conventional glaze; fully glazed 2-1⁄8″ trapway
- Performance: MaP score of 1,000 grams at ≤1.6 GPF
- Height: ~15″ total; bowl rim sits at ~13⅛″ above floor (ADA compliant)
- Inlet/Trap: Top spud inlet (1½″), 2 × ½″ fully glazed trapway; load rating up to 1,000 lbs
- ASME A112.19.2 / CSA B45.1; ANSI A117.1 (ADA); complies with ICC/IAPMO standards

LAVATORY: **Kohler Greenwich™ K-2035-0**

- 22″ (L) × 18″ (W) × 34″ (H) wall-mounted sink with overflow and shroud
- 4″ centers (K-2035-4) faucet drilling
- Material: Vitreous china with glazed underside for hygiene and durability
- ICC/ANSI A117.1 accessibility standard
- Basin Size: Approx. 18″ × 12″; 4″ water depth, 1¾″ drain opening
- Clearances: ADA-accessible installation dimensions include 8″ minimum clearance at wall, 27″ minimum from floor to underside of apron
- ASME A112.19.2 / CSA B45.1, CSA B651, ADA compliance, IAPMO/UPC

WATER HEATER: **AO Smith Dura-Power™ 40-Gallons DEN (Commercial Electric)**

- Capacity: 40 U.S. gallons (~150 liters)
- Supports typical unit demand (3 bathrooms + kitchen)
- Approx. 59" height × 20½" diameter (round tank line)
- Dual copper elements, up to 6 kW (single-phase) or 12 kW (dual)
- Upright (DEN series), compact for residential closets or utility closets
- Glass-lined tank for corrosion protection, commercial-grade anode rod
- Configurable for 208 V or 240 V power in the field
- UL, ASHRAE 90.1, IPC/BPC

MECHANICAL SYSTEM – FIRE PROTECTION

DESIGN DEVELOPMENT | JINGYING ZHENG | SUMMER 2025

FIRE PROTECTION SYSTEM COMPONENTS

Automatic Fire Sprinkler System:
A full-coverage, wet-pipe sprinkler system is installed throughout all floors, including tenant spaces, corridors, mechanical rooms, and common areas.

Standpipe System:
Class I standpipe system installed in each stairwell, providing 2.5" fire hose connections on every floor for fire department use.

Fire Hose Cabinets (FHCs):
Fire hose cabinets with 1.5" hoses are located in multiple areas such as common corridors, mechanical floors, and high-occupancy zones (required by code).

Fire Alarm and Detection System:
A fire alarm system with smoke detectors, manual pull stations, and audible/visual notification devices is installed throughout the building.

Portable Fire Extinguishers:
ABC-rated fire extinguishers are distributed per NFPA 10 requirements. They are wall-mounted in visible and accessible locations, including lobbies, corridors, electrical rooms, and tenant suites.

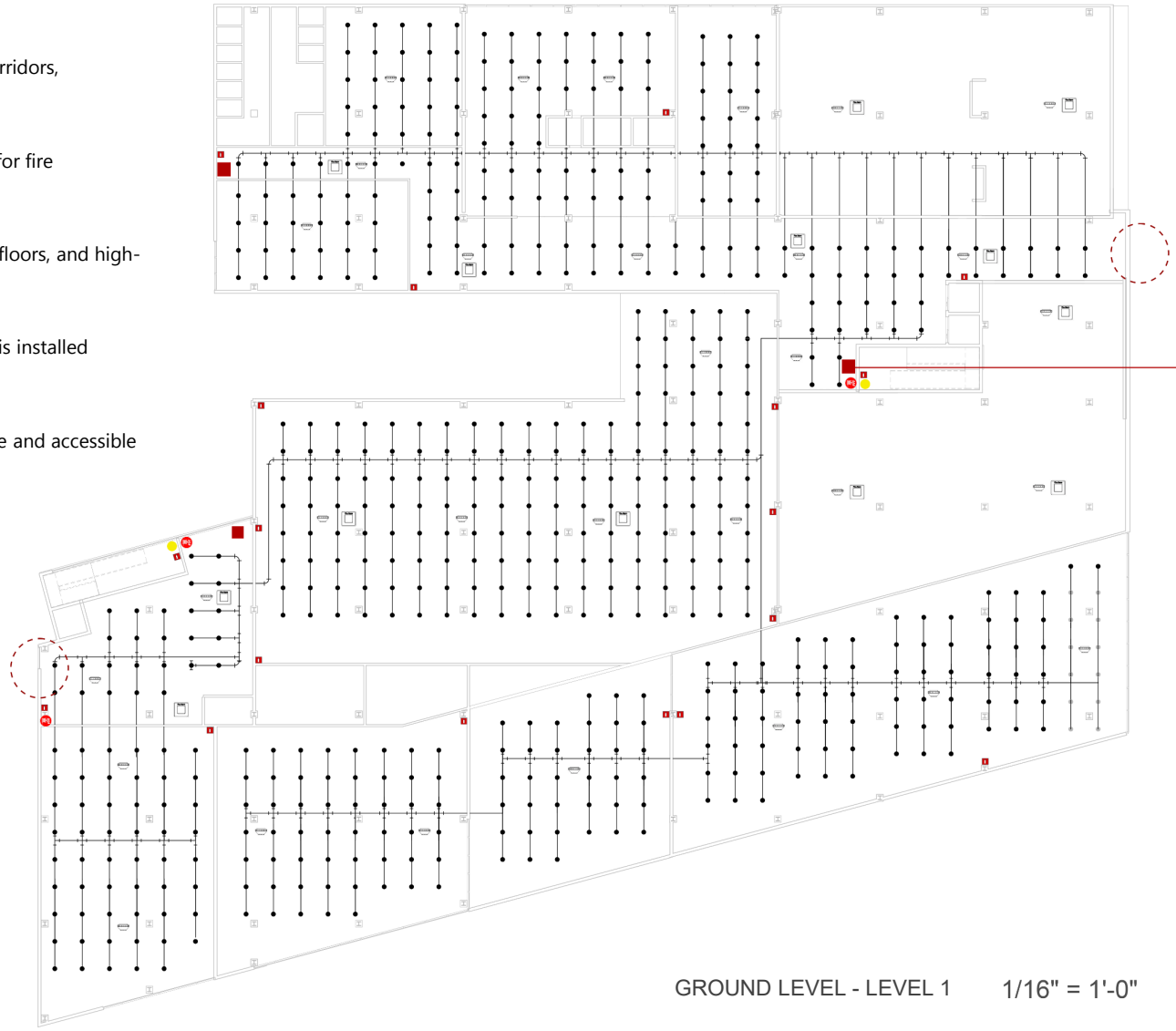
FIRE SPRINKLER

FIRE EXTINGUISHER

FHC – FIRE HOSE CABINET

LEGENDS

- FIRE SPRINKLER (Spaced per 6 ft)
- SPRINKLER PIPE
- STANDPIPE
- FIRE EXTINGUISHER
- (FHC) FIRE HOSE CABINET
- SMOKE ALARM (Spaced per 30 ft)
- FIRE ALARM (All egress paths, residential corridors, mechanical roomsspacing rule)
- MAIN ENTRANCE
- FIRE HYDRANT
- FIRE RISER (LOCATED IN LEVEL 1 MECHANICAL ROOM)
- FIRE MAIN



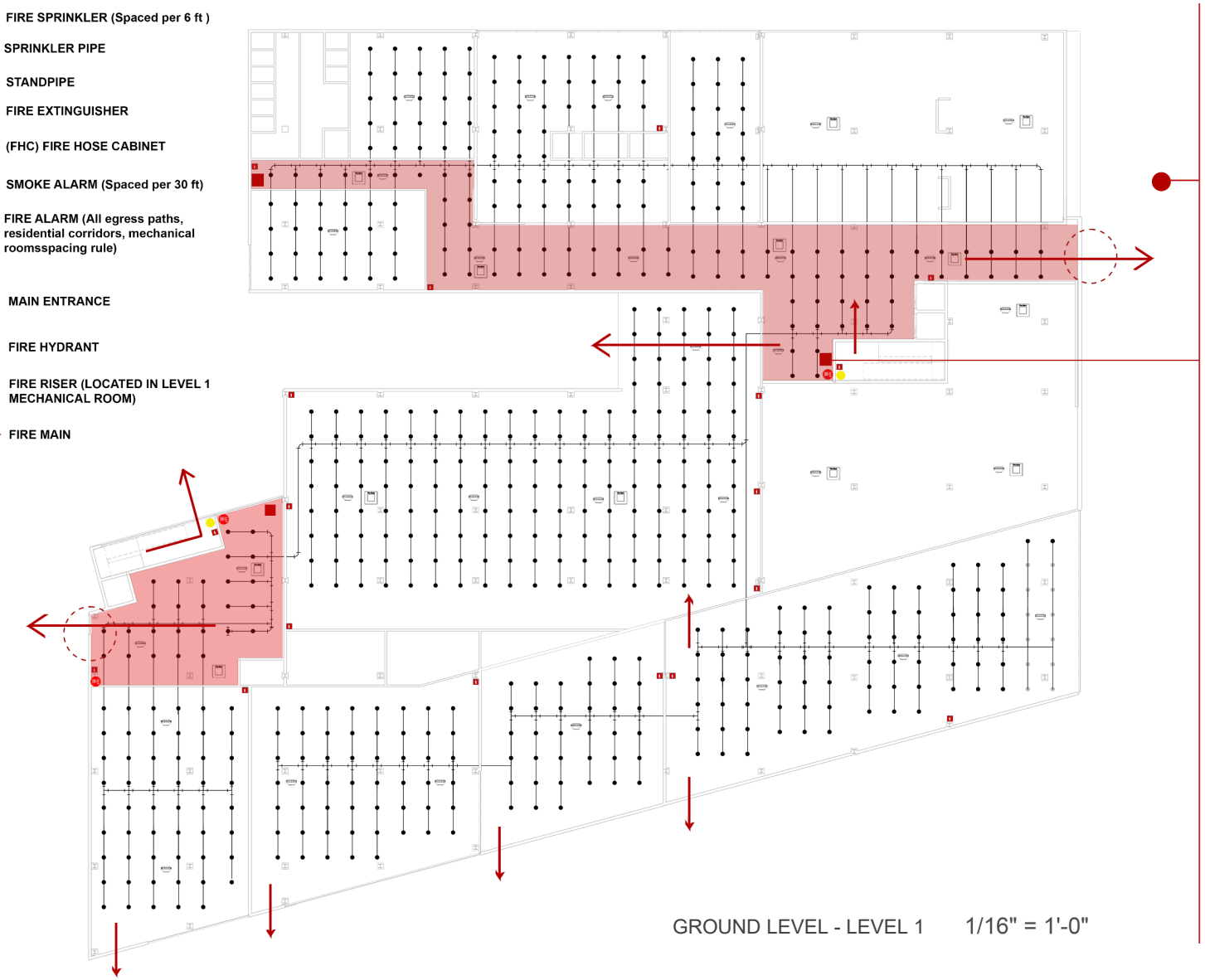
GROUND LEVEL - LEVEL 1 1/16" = 1'-0"

Component	Specification	Notes
Standpipe Diameter	4 inches (Ø4")	Class I manual wet standpipe system (2½" hose valves); located in each stairwell; required for high-rise buildings
Number of Standpipes	2 total	one per exit stairwell (two stair cores)
Sprinkler Pipe Diameter	¾" (branch lines); 1½"–4" mains	
Sprinkler Head Type	Quick Response Pendent	6′ x 6′ spacing Flush in finished ceilings
Fire Extinguishers – 1st Floor (Common Areas)	12 units	Wall-mounted within 75 ft travel distance per NFPA 10; in lobby, amenities, corridors, retail/office zones
Fire Extinguishers – Parking Garage (1st Floor)	6 units	Spread across facility
Fire Extinguishers – Residential Floors (Levels 2–20)	6 units per floor × 19 floors = 114 total	Located in common corridors, at exits, elevator lobbies; dry chemical
Fire Alarm System	Addressable fire alarm with voice evac and manual pull stations	audible notification devices in corridors and mechanical rooms
Fire Department Connection (FDC)	2-way or 4-way Siamese inlet; visible signage; backflow check valves	Located on accessible façade within 100 ft of fire lane; connects to standpipe and sprinkler risers
Stairwell Pressurization	Supply fans with standby power; 12"–18" duct depending on shaft size	Required for high-rise stairwell smoke control per IBC §909; ties to fire alarm system
Shaft Enclosure Rating	2-hour fire-rated construction	All risers, stairs, and elevator shafts enclosed per IBC §713

LEGENDS

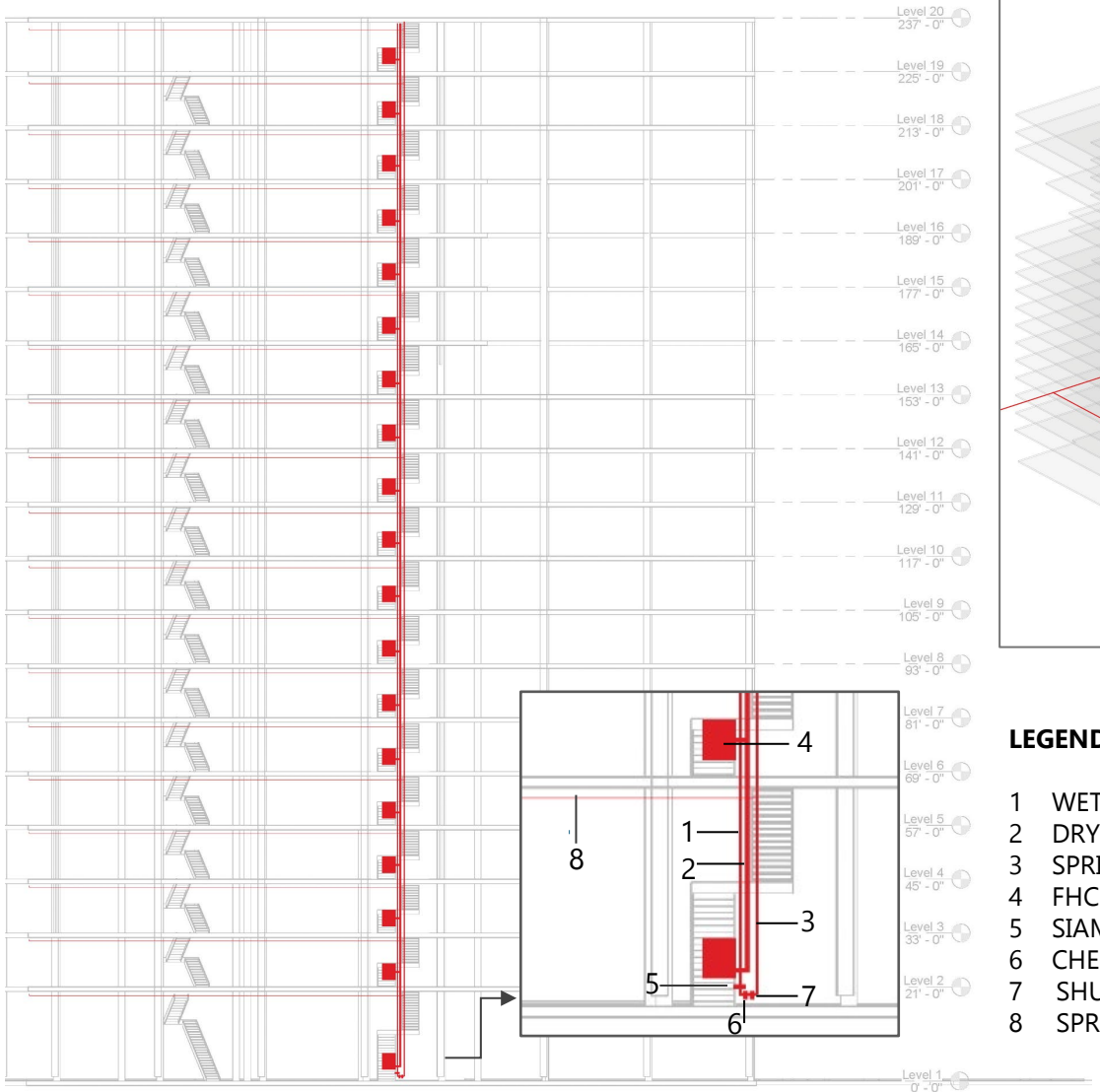
- FIRE SPRINKLER (Spaced per 6 ft)
- SPRINKLER PIPE
- STANDPIPE
- FIRE EXTINGUISHER
- (FHC) FIRE HOSE CABINET
- SMOKE ALARM (Spaced per 30 ft)
- FIRE ALARM (All egress paths, residential corridors, mechanical roomsspacing rule)
- MAIN ENTRANCE
- FIRE HYDRANT
- FIRE RISER (LOCATED IN LEVEL 1 MECHANICAL ROOM)
- FIRE MAIN

NOTE:
Area shaded in red = egress space/ path
Red arrow = Evacuate circulation and direction

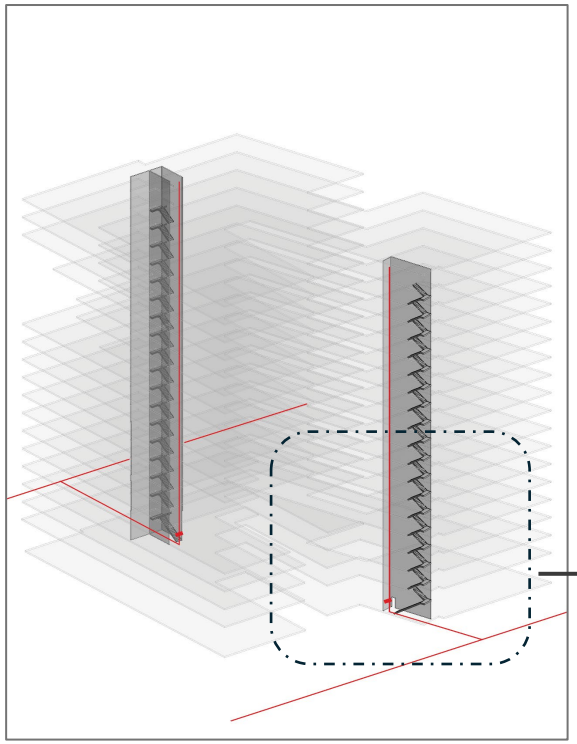


GROUND LEVEL - LEVEL 1 1/16" = 1'-0"

Note: Siamese pipe fitting is located at the exterior wall in front of the fire stairs.

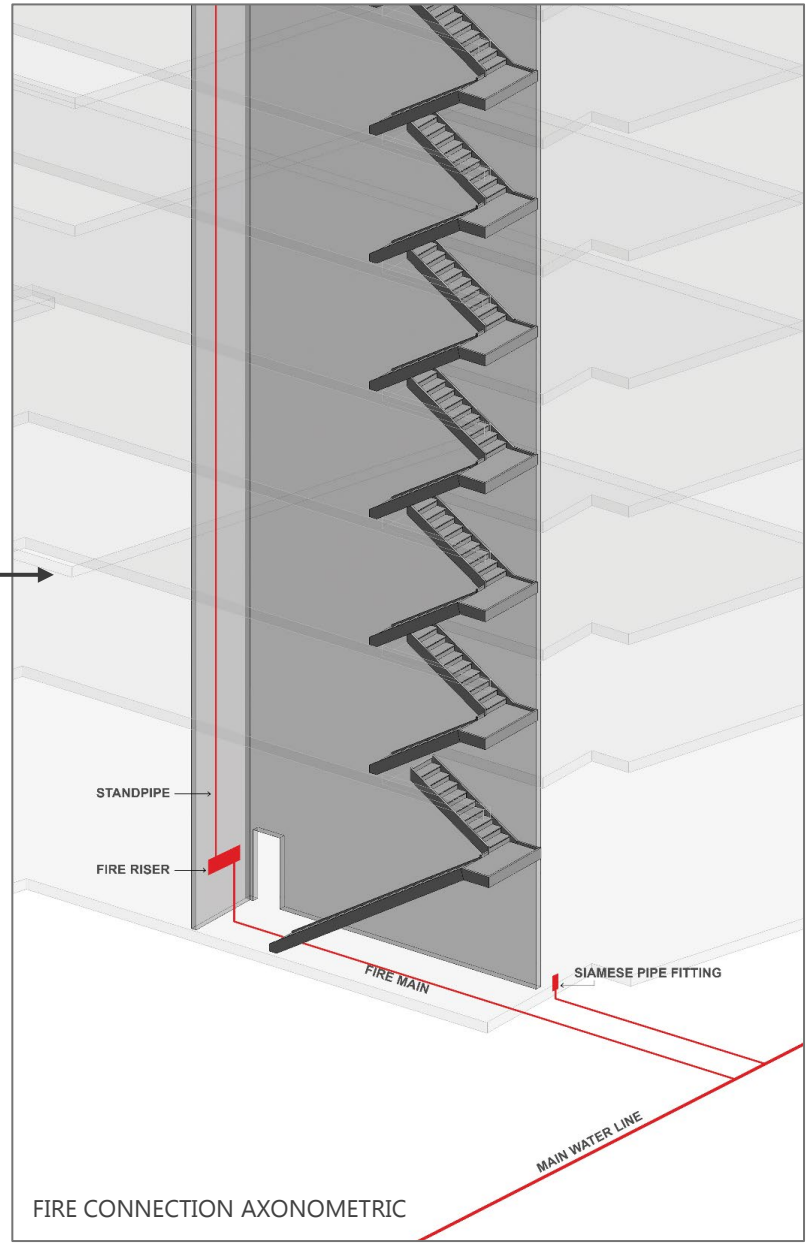


EAST ELEVATION 1/16" = 1' 0"



LEGENDS

1 WET STANDPIPE
2 DRY STANDPIPE
3 SPRINKLER SYSTEM STANDPIPE
4 FHC – FIRE HOSE CABINET
5 SIAMESE PIPE
6 CHECK VALVE
7 SHUTOFF VALVE
8 SPRINKLER PIPE



FIRE CONNECTION AXONOMETRIC

COST ESTIMATE

DESIGN DEVELOPMENT | JINGYING ZHENG | SUMMER 2025

CONSTRUCTIONAL COST ESTIMATE

Subtotal = $198,911,000

Contingency (10%) =19,891,100

Final Project Budget Estimate ≈ $243,802,100

Total Gross Floor Area:
250′ × 250′ × 20 floors = 1,250,000 SF

Final Total Project Cost:
≈ $243,802,100

Cost per Square Foot :
$243,802,100 ÷ 1,250,000 SF
≈ $195.04 per SF

Division / Category	Area / Qty	Unit Cost ($/SF or EA)	Estimated Cost ($)
01 General Conditions	1,250,000 SF	$12.00	$15,000,000
02 Earthwork / Excavation	62,500 SF site	$6.00	$375,000
03 Foundation – Piles (cast-in-place)	~1,000 piles (avg 24″)	$3,500 per pile	$3,500,000
03 Raft / Pile Caps (partial slab)	~65,000 SF	$25.00	$1,625,000
03 Superstructure Concrete (slabs, cores)	~385,000 SF	$35.00	$13,475,000
04-05 Structural Steel (composite frame)	Structural beams span in both X and Y directions at 30-foot intervals, forming a uniform two-way framing grid. Columns are spaced at 30 feet on center	$45.00	$25,000,000
06 Envelope – Curtain Wall (50%)	~125,000 SF	$65.00	$8,125,000
06 Envelope – Precast Concrete Panels (50%)	~125,000 SF	$38.00	$4,750,000
07 Insulation – Behind Precast Wall	~125,000 SF	$4.00	$500,000
07 Insulation – Spandrel (3"x3'x250', 20 floors)	5,000 SF	$7.00	$35,000
09 Interior Finishes	1,250,000 SF	$22.00	$27,500,000
11 Equipment (kitchens, elevators, built-ins)	68 units + 4 shafts	Lump sum	$2,500,000
13 Special Systems (fire alarm, sprinklers)	1,250,000 SF	$5.00	$6,250,000
14 Conveying (Elevators)	4 shafts	$300,000/ea	$1,200,000
15 Mechanical (HVAC, chillers, piping)	1,250,000 SF	$22.00	$27,500,000
16 Electrical + Lighting	1,250,000 SF	$16.00	$20,000,000
17 Plumbing (fixtures, risers, pipework)	68 units + amenities	$10,000/unit avg	$2,000,000
Parking Garage (5 floors)	119,700 SF	$80.00	$9,576,000